High End

S Y S T E M S ®

STUDIO
250
SERIES

User Manual

LR
LIGHTWAVE
RESEARCH®

For the latest product updates and information not contained
in this manual, visit the High End Systems Product Support page:
http://info.highend.com/service/prodsupt.html

STUDIO SPOT™ 250
STUDIO COLOR® 250

User Manual
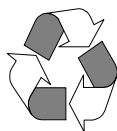
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Declaration of Conformity
according to ISO/IEC Guide 22 and EN45104

Manufacturer's name: Lightwave Research
Manufacturer's address: 2217 West Braker Lane
Austin, Texas 78758 USA

Distributor's name: High End Systems, Inc.
Distributor's address: 2217 West Braker Lane
Austin, Texas 78758 USA

Declares that the product

Product Name: Studio Color 250
Studio Spot 250
Product Number: All
Product Options: All

conforms to the following EEC directives:
73/23/EEC, as amended by 93/68/EEC
89/336/EEC, as amended by 92/31/EEC and 93/68/EEC

Equipment referred to in this declaration of conformity was first manufactured in compliance with the following standards in 1999:

Safety: EN 60598-1 : 1993
EN 60598-2-17 ; 1989
                        A1-A3 : 1993

EMC: EN 55022, 1987 Class A ITE
IEC 801-2, 1991 Level 3(6/8 kV)
IEC 801-3, 1991 Draft 5, Level 2 (3 V/m)
IEC 801-4, 1988 Level 2 (1 kV/0.5 kV)

Kenneth Hansen

USA, Friday, February 12, 1999
Kenneth Stuart Hansen, Compliance Engineer

Product Modification Warning

High End Systems products are designed and manufactured to meet the requirements of United States and International safety regulations. Modifications to the product could affect safety and render the product non-compliant to relevant safety standards.

Mise En Garde Contre La Modification Du Produit

Les produits High End Systems sont conçus et fabriqués conformément aux exigences des règlements internationaux de sécurité. Toute modification du produit peut entraîner sa non conformité aux normes de sécurité en vigueur.

Produktmodifikationswarnung

Design und Herstellung von High End Systems entsprechen den Anforderungen der U.S. Amerikanischen und internationalen Sicherheitsvorschriften. Abänderungen dieses Produktes können dessen Sicherheit beeinträchtigen und unter Umständen gegen die diesbezüglichen Sicherheitsnormen verstoßen.

Avvertenza Sulla Modifica Del Prodotto

I prodotti di High End Systems sono stati progettati e fabbricati per soddisfare i requisiti delle normative di sicurezza statunitensi ed internazionali. Qualsiasi modifica al prodotto potrebbe pregiudicare la sicurezza e rendere il prodotto non conforme agli standard di sicurezza pertinenti.

Advertencia De Modificación Del Producto

Los productos de High End Systems están diseñados y fabricados para cumplir los requisitos de las reglamentaciones de seguridad de los Estados Unidos e internacionales. Las modificaciones al producto podrían afectar la seguridad y dejar al producto fuera de conformidad con las normas de seguridad relevantes.

FCC Information

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Important Safety Information

Instructions pertaining to continued protection against fire, electric shock, exposure to excessive ultraviolet (UV) radiation, and injury to persons are found in Appendix C.

Please read all instructions prior to assembling, mounting, and operating this equipment.

Important: Informations De Sécurité
Les instructions se rapportant à la protection permanente contre les incendies, l'électrocution, l'exposition à un rayonnement ultraviolet (UV) excessif et aux blessures corporelles se trouvent dans l'Annexe C.

Veuillez lire toutes les instructions avant d'assembler, de monter ou d'utiliser cet équipement.

Wichtige Sicherheitshinweise
Sicherheitsanleitungen zum Schutz gegen Feuer, elektrischen Schlag, übermäßige UV-Strahlung und Verletzung von Personen finden Sie in Anhang C.

Vor der Montage, dem Zusammenbau und der Intbetriebnahme dieses Geräts alle Anleitungen sorgfältig durchlesen.

Informazioni Importanti Di Sicurezza
Le istruzioni sulla protezione da incendi, folgorazione, esposizione eccessiva a raggi ultravioletti (UV) e infortuni sono contenute nell'appendice C.

Si prega di leggere tutte le istruzioni prima di assemblare, montare e azionare l'apparecchiatura.

Informacion Importante De Seguridad
En el Apéndice C se encuentran instrucciones sobre protección continua contra incendios, descarga eléctrica, exposición excesiva a radiación ultravioleta (UV) y lesiones personales.

Lea, por favor, todas las instrucciones antes del ensamblaje, montaje y operación de este equipo.

Warranty Information

Limited Warranty

Unless otherwise stated, your product is covered by a two year parts and labor limited warranty. The Laser Aiming Device (LAD™) for Studio Spot 250 and Studio Color 250 fixtures is covered by a six (6) month parts and labor limited warranty. Dichroic filters and LithoPatterns® high resolution glass gobos are not guaranteed against

breakage or scratches to coating. It is the owner's responsibility to furnish receipts or invoices for verification of purchase, date, and dealer or distributor. If purchase date cannot be provided, date of manufacture will be used to determine warranty period.

Returning an Item Under Warranty for Repair

It is necessary to obtain a Return Material Authorization (RMA) number from your dealer or point of purchase **BEFORE** any units are returned for repair. The manufacturer will make the final determination as to whether or not the unit is covered by warranty. Lamps are covered by the lamp manufacturer's warranty.

Any Product unit or parts returned to High End Systems must be packaged in a suitable manner to ensure the protection of such Product unit or parts, and such package shall be clearly and prominently marked to indicate that the package contains returned Product units or parts and with an RMA number. Accompany all returned Product units or parts with a written explanation of the alleged problem or malfunction. Ship returned Product units or parts to: 2227 West Braker Lane, Austin, TX 78758 USA.

> **Note:** Freight Damage Claims are invalid for fixtures shipped in non-factory boxes and packing materials.

Freight

All shipping will be paid by the purchaser. Items under warranty shall have return shipping paid by the manufacturer only in the Continental United States. **Under no circumstances will freight collect shipments be accepted.** Prepaid shipping does not include rush expediting such as air freight. Air freight can be sent customer collect in the Continental United States.

REPAIR OR REPLACEMENT AS PROVIDED FOR UNDER THIS WARRANTY IS THE EXCLUSIVE REMEDY OF THE CONSUMER. HIGH END SYSTEMS, INC. MAKES NO WARRANTIES, EXPRESS OR IMPLIED, WITH RESPECT TO ANY PRODUCT, AND HIGH END SPECIFICALLY DISCLAIMS ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. HIGH END SHALL NOT BE LIABLE FOR ANY INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGE, INCLUDING LOST PROFITS, SUSTAINED OR INCURRED IN CONNECTION WITH ANY PRODUCT OR CAUSED BY PRODUCT DEFECTS OR THE PARTIAL OR TOTAL FAILURE OF ANY PRODUCT REGARDLESS OF THE FORM OF ACTION, WHETHER IN CONTRACT, TORT (INCLUDING NEGLIGENCE), STRICT LIABILITY OR OTHERWISE, AND WHETHER OR NOT SUCH DAMAGE WAS FORESEEN OR UNFORESEEN.

Warranty is void if the product is misused, damaged, modified in any way, or for unauthorized repairs or parts. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

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Introduction

Congratulations on your purchase of the Studio Spot™ 250 or Studio Color® 250 automated luminaire.

Studio Spot 250 fixtures use a high-efficiency optical configuration with a patented reflector and optical train to produce sharp, high contrast images. Shipped standard with Studio Spot 250 are seven high-resolution LithoPatterns® which allow full rotating and indexing. Over the litho, you can superimpose a secondary static or rotating litho for moiré and morphing effects. Studio Spot 250 also includes an iris for even more control over image and beam size. Each Studio Spot 250 is fitted with a 13-position color wheel and a 5-position, rotating effects wheel which includes prisms and effects glass as standard.

The Studio Color 250 fixture is a soft-focus companion to the Studio Spot 250. Studio Color 250 uses the same yoke mechanism, electronics, and optical system as Studio Spot 250, and produces over 7,000 lumens. Fitted with a full CYM (cyan, yellow, and magenta) subtractive color mixing system, Studio Color 250 also includes six independent colors (including a black light filter) to supplement its spectrum of colors. A lenticular effect wheel allows variable horizontal and vertical beam shaping.

Studio Spot™ 250 Features

- Two user types (A and B) per fixture, each with an on-board 16 scene memory for a total of 32 scene memory per fixture in stand-alone mode.
- High-resolution DMX 512 control.
- Easy-to-program alphanumeric LED (light emitting diode) display.
- DMX macro channel factory-programmed with unique combinations of constructs including functions such as ballyhoos and lazy-eight movements - functions which, in the past, could be accomplished only with the use of top of the range controllers.
- Iris that provides full control over beam size.
- Both 3-pin and 5-pin XLR connectors.
- Factory-programmed fixture demo built in as a preset default while in stand-alone mode.
- High efficiency, 2000 hour MSD250/2 lamp developed by Philips® in conjunction with High End Systems®, Inc.
- Motion range of 570° pan and 270° tilt.
- Exclusive Lightwave Research® multi-phase technology and optical encoders to automatically correct the beam's position if the fixture's head is jarred from its programmed position.

- High efficiency reflector and optical train providing over 4,000 total lumens.
- Color wheel that includes 12 positions (plus open) and allows for easy dichroic filter changes. Colors chosen to match the Technobeam® automated luminaire.
- Fully rotating and indexing litho wheel that includes 7 positions (plus open) and allows for easy litho changes.
- Double-stacking litho options for moiré and morphing effects.
- Fully rotating effects wheel with four positions (plus open) including frost, 3-way prism, infinity prism, and distortion art glass.
- Enhanced construct parameters including ramp/snap, random, and spin functions.
- Projector sharp, high contrast output.
- Factory-installed 18° lens with optional lens sets available as accessories.*
- Time code synchronization in stand-alone mode via master/slave links to any combination of Technobeam, Studio Spot™, Studio Color 250, and Studio Spot 250 fixtures.
- DMX analyzer for easy DMX troubleshooting.
- Variable-speed strobe.
- Full dimming and fade-to-black.
- Remote focus.
- LED status indicators.
- Precision stepper motors used to control iris, shutter, color, and effects wheels.
- Remote fixture power up and shut down.
- Optional Laser Aiming Device (LAD™) for beam positioning in daylight or high ambient light conditions.

*All beam angles are accurate to ±1°

Studio Color® 250 Features

- Two user types (A and B) per fixture, each with an on-board 16 scene memory for a total of 32 scene memory per fixture in stand-alone mode.
- High-resolution DMX 512 control.
- Easy-to-program alphanumeric LED (light emitting diode) display.
- DMX macro channel factory-programmed with unique combinations of constructs including functions such as ballyhoos and lazy-eight movements - functions which, in the past, could be accomplished only with the use of top of the range controllers.
- Both 3-pin and 5-pin XLR connectors.
- Two user types allowed per fixture, each with its own 16-scene memory and fixture settings.
- Factory-programmed fixture demo built in as a preset default while in stand-alone mode.

- Exclusive Lightwave Research® multi-phase technology and optical encoders to automatically correct the beam's position if the fixture's head is manually moved from its programmed position.
- High efficiency, 2000 hour MSD250/2 lamp developed by Philips® in conjunction with High End Systems®, Inc.
- Motion range of 570° pan and 270° tilt.
- Enhanced construct parameters including ramp/snap, random, and spin functions.
- High efficiency reflector and optical train providing over 7,000 total lumens.
- CYM color mixing.
- Soft-edge output from 115mm Fresnel lens with blending curve output.
- Six additional dichroic colors with seamless color change including CTO and black light filter.
- Rotatable, variable horizontal and vertical beam shaping.
- Motorized zoom for additional beam angle flexibility.
- Time code synchronization in stand-alone mode via Master/Slave links to any combination of Technobeam, Studio Spot™, Studio Color 250, and Studio Spot 250 fixtures.
- DMX analyzer for easy DMX troubleshooting.
- Variable-speed strobe.
- Full dimming and fade-to-black.
- Easy-to-program alphanumeric LED display.
- LED status indicators.
- Precision stepper motors used to control shutter, color wheels, and beam shaping (lenticular) wheel.
- Remote fixture power up and shut down.
- Optional Laser Aiming Device (LAD™) for beam positioning in daylight or high ambient light conditions.

Symbols

The following international caution and warning symbols appear in margins throughout this manual to highlight messages.

Caution: **This symbol appears adjacent to Caution messages. Not heeding these messages could result in personal injury and/or damage to equipment.**

Warning: **This symbol appears adjacent to high voltage warning messages. Not heeding these messages could result in serious personal injury.**

This symbol indicates that a fire hazard is present. Not heeding these messages could result in serious personal injury.

This symbol indicates that eye protection is required.

This symbol indicates an explosion hazard.
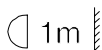
1m This symbol indicates the minimum distance to a lighted object, which in this case, is 1 meter.

This symbol indicates a hot surface.

Document Conventions

This manual uses the following conventions for menus and menu navigation buttons:

Example	Meaning
<Button>	Press the appropriate LED display navigation button on the fixture. For example, the <Enter> button on the fixture's LED display panel (see Table 2-1 on page 2-4).
"Menu Option"	Quotation marks are used to indicate the appropriate menu selection you should choose from the on-board menu system. For example, the "ADDR" menu option.

Specifications

Physical Specifications

	Height	Width (including handles)	Depth	Weight
Studio Spot 250*	23.06 in. (585.6 mm)	19.59 in. (497.5 mm)	11.62 in. (295.1 mm)	49.3 lbs. 22.4 kg
Studio Color 250*	22.0 in. (553.6 mm)	19.59 in. (497.5 mm)	11.62 in. (295.1 mm)	47.5 lbs. 21.5 kg

*For additional dimensions, refer to Figure intro-1.

Studio Spot 250

19.59 in.
(497.5mm)

.25 in.
(6.3mm)

11.62 in.
(295.1mm)

18.01 in.
(457.5mm)

15.25 in.
(388.6mm)

13.77 in.
(348.5mm)

1.00 in.
(25.4mm)

2.25 in.
(57.6mm)

19.08 in.
(484.6mm)

9.73 in.
(247.1mm)

17.60 in.
(447mm)

4.27 in.
(108.5mm)

4.83 in.
(122.6mm)

11.62 in.
(295.1mm)

.63 in.
(16mm)

Studio Color 250

19.59 in.
(497.5mm)

.25 in.
(6.3mm)

11.62 in.
(295.1mm)

18.01 in.
(457.5mm)

14.03 in.
(356.4mm)

13.77 in.
(348.5mm)

1.00 in.
(25.4mm)

2.25 in.
(57.6mm)

19.08 in.
(484.6mm)

.25 in.
(6.4mm)

9.73 in.
(247.1mm)

16.54 in.
(415mm)

4.27 in.
(108.5mm)

4.83 in.
(122.6mm)

11.62 in.
(295.1mm)

.63 in.
(16mm)
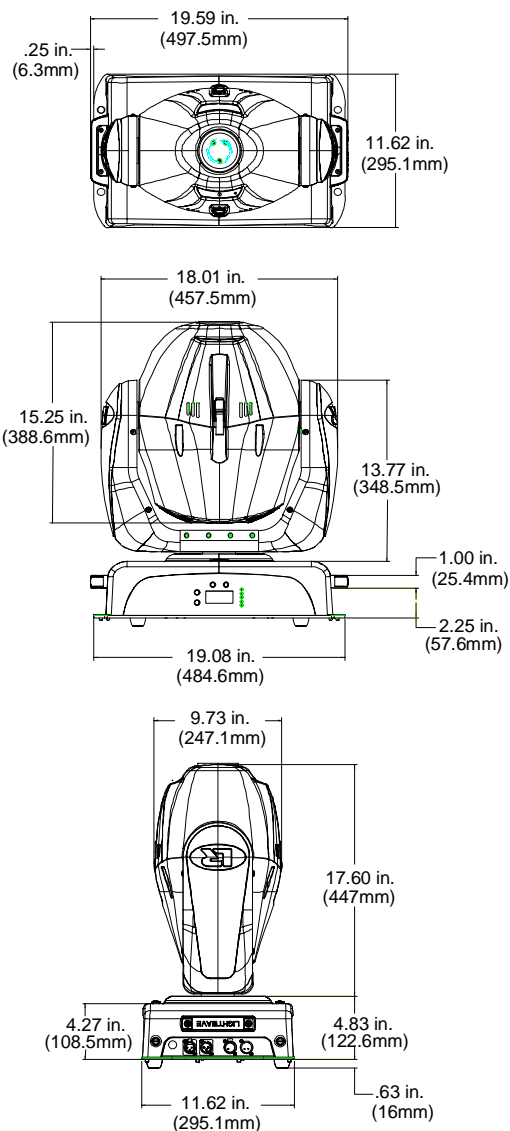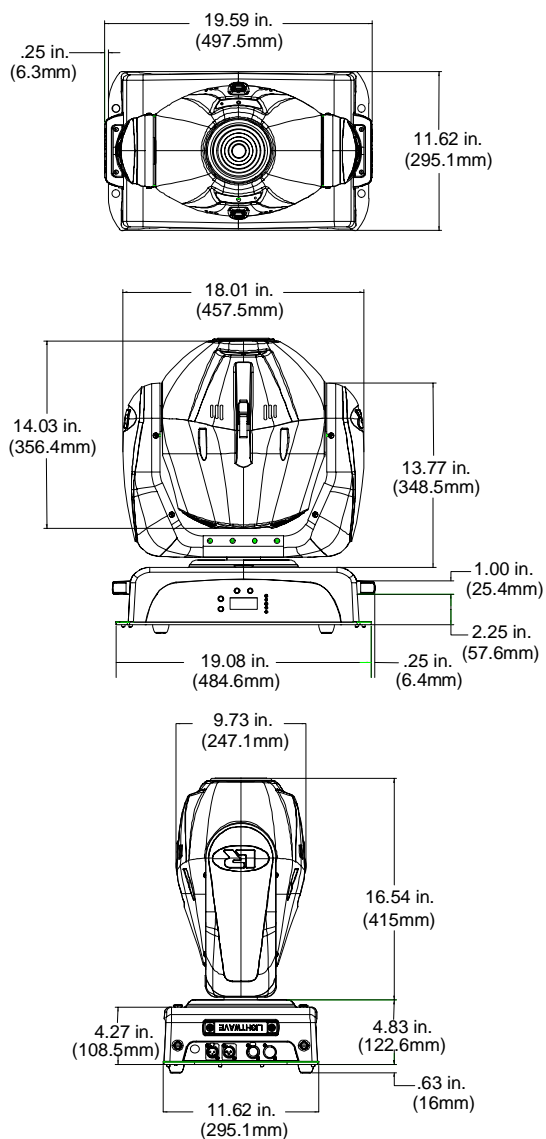
Figure intro-1. Studio Spot™ 250 and Studio Color® 250 dimensions.

Electrical Specifications

⚠ **Warning: Class 1 equipment - This equipment must be earthed.**

Factory setting: 230V, 50Hz

Selectable voltages: 100V, 50Hz, 3.75 A
120V, 50Hz, 3.13 A
230V, 50Hz, 1.6 A
100V, 60Hz, 3.75 A
120V, 60Hz, 3.13 A
208V, 60Hz, 1.8 A

Rated power: 375 W

Fuses: **F1** - 6.3A, 250V, Fast Blow only (5 mm x 20 mm)
F2 - 2.5A, 250V, Fast Blow only (5 mm x 20 mm)
F3 - 6.3A, 250V, Slow Blow only (5 mm x 20 mm)

Environmental Specifications
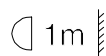
Maximum ambient temperature, (T_a): 50° C (122° F)
Maximum exterior surface temperature: 100° C (212° F)
Minimum distance to flammable objects: 3.28 ft (1.0 m)
Minimum distance to lighted object: 3.28 ft (1.0 m)

⚠ **Do not mount on a flammable surface.**

Laser Aiming Device (LAD™) Specifications

- Class 3a laser product
- Beam divergence angle: 0.2mRad to 0.3mRad
- Maximum output (continuous): 5mW at 630-650 nm
- Maximum output (pulsed): <2.5mW
- Pulse modulation: 4.25Hz to 255Hz @ 50% duty cycle
- Pulse duration: 1.96ms to 117ms
- Pulse energy: 9.8μJ to 585μJ

LAD™ Safety Standards

- EN60825-1, 1994
- 21CFR 1040

Dichroic, Litho, and Effect Specifications

Dichroic Glass
- Diameter: 1.125" ± 0.010" (28.5 mm ± 0.25 mm)
- Thickness: 0.069" ± 0.010" (1.8 mm ± 0.25 mm)

LithoPatterns
- Diameter: 0.996" ± 0.005" (25 mm ± 0.13 mm)
- Image area: 0.860" ± 0.005" (22 mm ± 0.13 mm)
- Thickness (rotating litho): 0.105" ± 0.005" (2.7 mm ± 0.13 mm)
- Thickness (static litho): 0.069" ± 0.010" (1.8 mm ± 0.25 mm)

Effect Glass
- Diameter: 1.430" ± 0.010" (36 mm ± 0.25 mm)
- Image area: 1.040" ± 0.010" (26 mm ± 0.25 mm)
- Maximum thickness: 0.175" (4.4 mm)

Lamp Specifications

Lamp type: Philips MSD250/2
Color temperature: 6500 K

Cable and Connector Specifications

DMX data cables:
Belden® 9841 or equivalent (meets specifications for EIA RS-485 applications) with the following characteristics:
- 2-conductor twisted pair plus a shield
- maximum capacitance between conductors - 30 pF/ft.
- maximum capacitance between conductor and shield - 55 pF/ft.
- maximum resistance of 20 Ω / 1000 ft.
- nominal impedance 100-140 Ω

DMX data connectors:
3-pin or 5-pin male and female XLR connectors

DMX data terminators:
Male XLR connector with 120 ohm terminator

Optional Accessories

Table intro-1 lists the Studio Spot 250 and Studio Color 250 optional accessories available from your High End Systems dealer/distributor.

Table intro-1. Studio Spot™ 250 and Studio Color® 250 Optional Accessories

Part Description	Part Number
18° Studio Spot 250 lens	40060001
27° Studio Spot 250 lens	40060002
40° Studio Spot 250 lens	40060003
Studio Color 250 lens	Call*
Replacement MSD250/2 lamp	55030051
Color wheel dichroic filters	Call*
LithoPatterns	Call*
Effect Glass	Call*
Status Cue® Lighting Console	22020002
High End Systems Laser Aiming Device (LAD)	29060002
Heavy duty 3-pin XLR cable (10')	55050005 (10')
Heavy duty 3-pin XLR cable (25')	55050006 (25')
Heavy duty 3-pin XLR cable (50')	55050007 (50')
Heavy duty 3-pin XLR cable (100')	55050008 (100')
Male 3-pin XLR terminator	90404039
Galvanized safety cable	12040001
Cheeseborough clamp	55040014
Lightwave Research Upload Dongle	26040002
Road case for Studio Spot 250 and Studio Color 250 fixtures	Call*

*Note: For more information about optional accessories, contact either your High End Systems dealer/distributor, High End System Sales, or visit the High End Systems Web site. For contact information, see "Contacting High End Systems" on page ii.

Chapter 1
Setup and Installation

1

Unpacking the Fixture

Unpack the Studio Spot 250 or Studio Color 250 and verify that the fixture arrived without damage. Inspect both the outside of the fixture for physical damage and the optical assembly for damage to glass components. To access the optical assembly, release the two latches located on the fixture head and remove the bezel (see Figure 1-1).
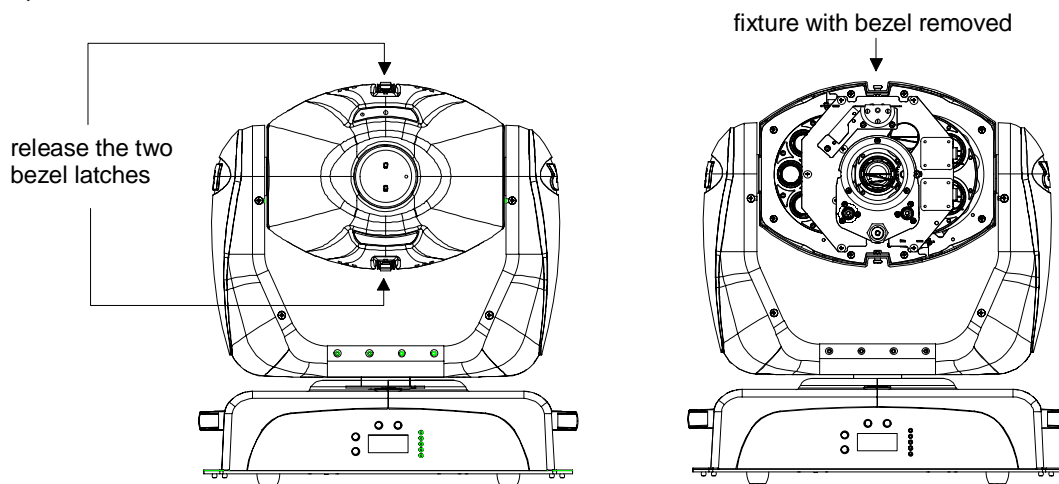
Figure 1-1. Removing the bezel.

If the fixture is damaged, notify both the shipping agent and your sales agent immediately.

Saving the Shipping Materials

Do not discard the shipping carton and packing materials. The carton and packing materials are specifically designed to protect the product during transport.

High End Systems assumes no responsibility for products that have been damaged during transport. Therefore, you should return a product for repair in its original shipping carton and packing materials.

Note: Before sending anything to the factory, call your High End Systems dealer/distributor for a Return Material Authorization (RMA) number. The factory cannot accept any goods shipped without an RMA number.

Setting the Fixture Voltage

Studio Spot 250 and Studio Color 250 fixtures are factory-set to 230V, 50Hz. If your power source differs, you must change the fixture's input voltage to match your power source. Studio Spot 250 and Studio Color 250 fixtures offer the following switch-selectable input voltage/frequency settings:

- 100V, 50Hz
- 120V, 50 Hz
- 230V, 50 Hz

- 100V, 60 Hz
- 120V, 60 Hz
- 208V, 60 Hz

Warnings: **1) Disconnect power before servicing.**

2) This fixture must be serviced by qualified personnel. The information in this section is intended to assist qualified service personnel only.

3) Be sure to match the voltage selection jumper to your power source *prior* to operating this equipment.

You will need:
- wide-tip, flat head screwdriver
- #1 Phillips-head screwdriver

To change the fixture's voltage/frequency setting:

1. Electrically isolate the fixture.

2. Using a wide-tip, flat head screwdriver, remove the two panel cover retaining screws from *each side of the fixture* and remove the fixture's two panel covers (see Figure 1-2).

two panel retaining screws   two panel covers
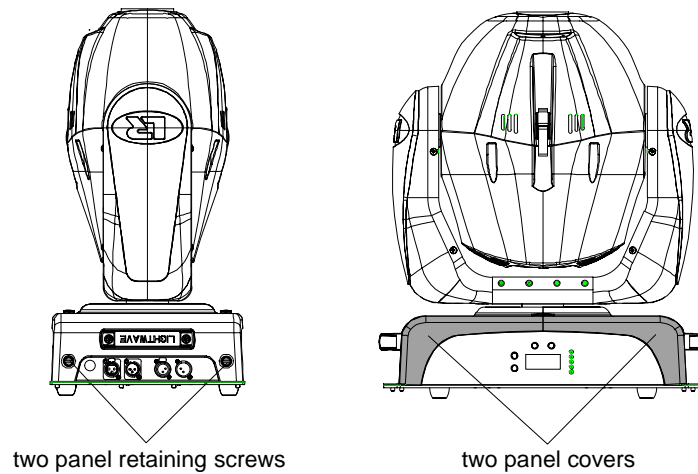
Figure 1-2. Remove the two panel covers.

3. Using a Phillips-head screwdriver, loosen (*but do not remove*) the two display panel retaining screws from each side of the fixture (see Figure 1-3).

LED display panel
retaining screw
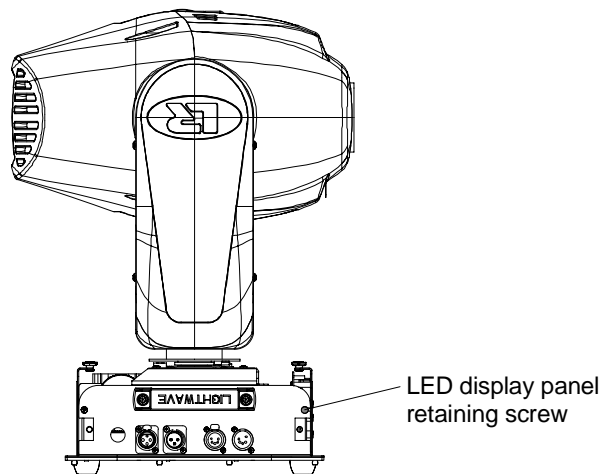
Figure 1-3. Loosen the two display panel retaining screws.

4. Gently lower the display panel to access the voltage switch blocks on the circuit board (see Figure 1-4).

gently lower the display panel

voltage select label

LIGHTWAVE
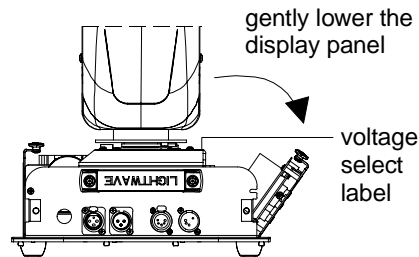
Figure 1-4. Lower the display panel.

5. Locate the voltage select label (see Figure 1-4) and the three switch blocks labeled "SW1," "SW2," and "SW3" on the circuit board located on the inside of the display panel (see Figure 1-5).

SW1 SW2 SW3

Figure 1-5. Circuit board containing the three switch blocks.

6. Choose an input voltage/frequency for the fixture by setting the switches as shown on the voltage select label (see Figure 1-6).

230V/50Hz	208V/60Hz	100V/50Hz	100V/60Hz	120V/50Hz	120V/60Hz
SW3 SW2 SW1	SW3 SW2 SW1	SW3 SW2 SW1	SW3 SW2 SW1	SW3 SW2 SW1	SW3 SW2 SW1
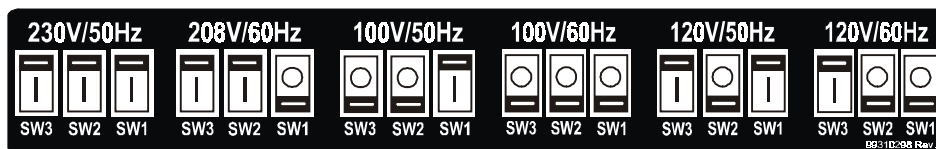
Figure 1-6. Voltage select label.

For example, to set the voltage input to 120 volts, 60 hertz, set switch 3 up (⊓), switch 2 down (○), and switch 1 down (○).

7. After selecting an input voltage/frequency, return the display panel to its original position and tighten the two display panel retaining screws.

8. Replace the two panel covers and tighten the four cover retaining screws.

Changing the Power Cord Cap

1

Studio Spot 250 and Studio Color 250 fixtures are shipped with an attached power cord cap. However, different locations (even within the same country) may require a different power cord cap to connect your fixture to a power outlet. Because of the variety of power cord caps used worldwide, High End Systems, Inc. cannot make specific recommendations for the particular power cord cap you should use. Contact a local authority if you are unsure which type of power cord cap you need to obtain. If you need to replace the power cord cap, note that the cores in the mains lead are colored in accordance with the following code:

- green and yellow = earth
- blue = neutral
- brown = live

⚠ **Warning: Class 1 equipment - This equipment must be earthed.**

Installing a Line Cord Cap - U.K. Only

In the United Kingdom, the colours of the cores in the mains lead of this equipment may not correspond with the colored markings identifying the terminals in your plug. Therefore, install a line cord cap in accordance with the following code:

- The core which is coloured green and yellow must be connected to the plug terminal which is marked with the letter "E," or by the earth symbol ⏚, or coloured green, or green and yellow.
- The core which is coloured blue must be connected to the terminal which is marked with the letter "N" or coloured black.
- The core which is coloured brown must be connected to the terminal which is marked with the letter "L" or coloured red.

⚠ **Warning: Class 1 equipment - This equipment must be earthed.**

Vigtig Fikker Heds Information - Danmark

Advarsel: Beskyttelse mod elektrisk chock.

Vigtigt!
Lederne med gul/groen isolation maa kun tilsluttes en klemme maerket
⏚ eller ⏚

Powering On the Fixture

Caution: **Do not power on the fixture until you have verified that the input voltage setting and line cord cap are suitable for the power source in your location. For more information, see "Setting the Fixture Voltage" on page 1-2 or "Changing the Power Cord Cap" on page 1-5.**

Warning: **This equipment for connection to a branch circuit having a maximum overload protection of 20 A.**

Studio Spot 250 and Studio Color 250 fixtures do not have a power switch. To power on the fixture, simply connect it to an appropriately-rated power source. Once connected, you can remotely power up or shutdown the fixture via controller commands (see "Control" on page 3-14). However, it is very important that you electrically isolate the fixture before performing certain procedures as shown in this manual.

Homing the Fixture

When you connect Studio Spot 250 or Studio Color 250 fixtures to an appropriately-rated power source, the fixture automatically begins a homing procedure to verify that the major functions of the fixture (color wheels, iris, and shutter) are oriented properly. During the homing process, you will hear clicking sounds as the wheels, iris, and shutter seek their home position. For information on remotely homing the fixture via a DMX controller, see "Control" on page 3-14. For information on manually homing the fixture via the on-board menu system, see "Homing the Fixture (HOME)" on page 4-30.

Identifying Display Panel Components

The front panel on Studio Spot 250 and Studio Color 250 fixtures has an alphanumeric LED (Light Emitting Diode) display, five status LEDs, and four menu navigation buttons (see Figure 1-7).
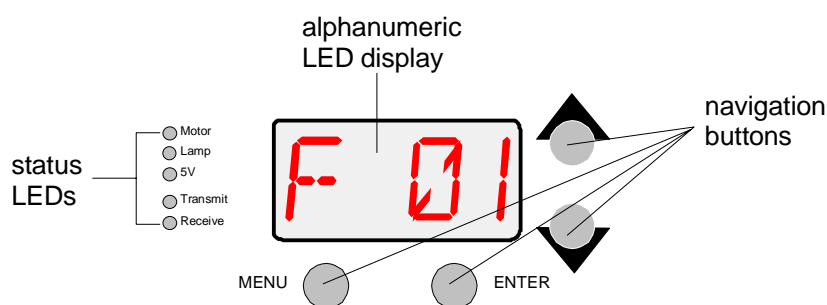
Figure 1-7. Front panel display.

Under normal circumstances, the alphanumeric display cycles between displaying the fixture's software version ("Vxxx"), the fixture name (either "SPOT" for Studio Spot 250 fixtures or "COLR" for Studio Color 250 fixtures), and the fixture's address (either "F xx" for fixture number or "Cxxx" for DMX start channel). However, if you are experiencing problems with your fixture, the status LEDs and/or alphanumeric display can also provide insight on where the problem is originating. For more information on error messages, see "LED Display Error Messages" on page 8-1 or "Status LEDs" on page 8-6.

Linking the Fixtures

To link one or more fixtures to a controller and/or to each other, you must obtain data cabling. You can either purchase cabling from High End Systems (see "Optional Accessories" on page intro-8) or construct your own cabling. If you choose to construct your own cabling, it must adhere to the specifications listed in "Constructing Cabling" below.

Constructing Cabling

If you choose to construct cabling, High End Systems recommends that you use data-grade cable. Data-grade cable is designed to carry a high-quality signal with less susceptibility to electromagnetic interference. Data-grade cables must be Belden® 9841 or equivalent (meets specifications for EIA RS-485 applications) with the following characteristics:

- 2-conductor twisted pair plus a shield
- maximum capacitance between conductors - 30 pF/ft.
- maximum capacitance between conductor and shield - 55 pF/ft.
- maximum resistance of 20Ω /1000 ft.
- nominal impedance 100-140Ω

Cable Connectors

Studio Spot 250 and Studio Color 250 fixtures can accept either 3-pin or 5-pin XLR cable connectors. Your cabling must have a male XLR connector on one end of the cable and a female XLR connector on the other end.

In a 3-pin connector, pin one is the common (cable shield), pin two is the data complement (negative), and pin three is the data true (positive) (see Figure 1-8).
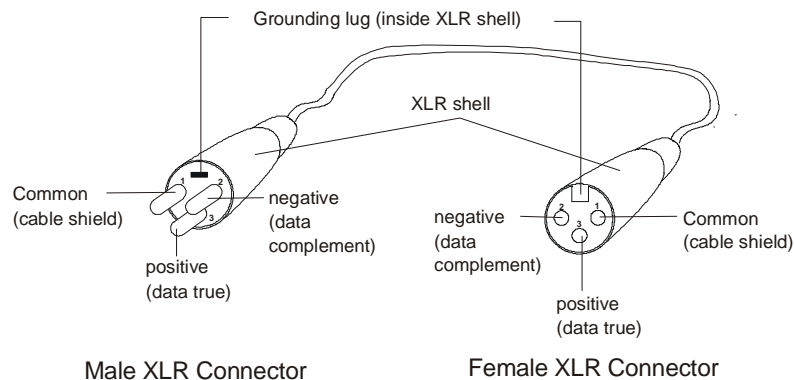
Figure 1-8. XLR 3-pin connector.

In a 5-pin connector, pin one is the common (cable shield), pin two is the data complement (negative), pin three is the data true (positive), and pins four and five are not used, but they allow a secondary data link to pass through the fixture (see Figure 1-9).

Grounding lug (inside XLR shell)

XLR shell

Common (cable shield)

negative (data complement)

positive (data true)

positive (data true)*

negative (data complement)*

positive (data true)*

negative (data complement)*

positive (data true)

Common (cable shield)

negative (data complement)

Male XLR Connector

Female XLR Connector

*This data line is not used by the fixture, but allows data to pass through the fixture.

Figure 1-9. XLR 5-pin connector.

You should test each cable with a voltage/ohm meter (VOM) to verify correct polarity and to make sure that the negative and positive pins are not grounded or shorted to the shield or to each other.

⚠ **Caution: Do not connect anything to the ground lug on the XLR connectors. Do not connect or allow contact between the common (cable shield) and the fixture's chassis ground. Grounding the common could cause a ground loop and/or erratic behavior.**

Setting up the Link

To link one or more fixtures to a controller and/or to each other, follow the steps below:

1. Connect a male XLR cable connector (with attached data cable) to the controller's Data Out connector.

   If you plan to control your fixtures in stand-alone mode (without a controller), connect a male XLR cable connector with attached data cable to the 3-pin or 5-pin Data Out connector *on the fixture* addressed at DMX start channel 1 or fixture number 1.

2. Connect the female XLR cable connector *of the same data cable* to the first (or next) fixture's 3-pin or 5-pin Data In connector (see Figure 1-10).
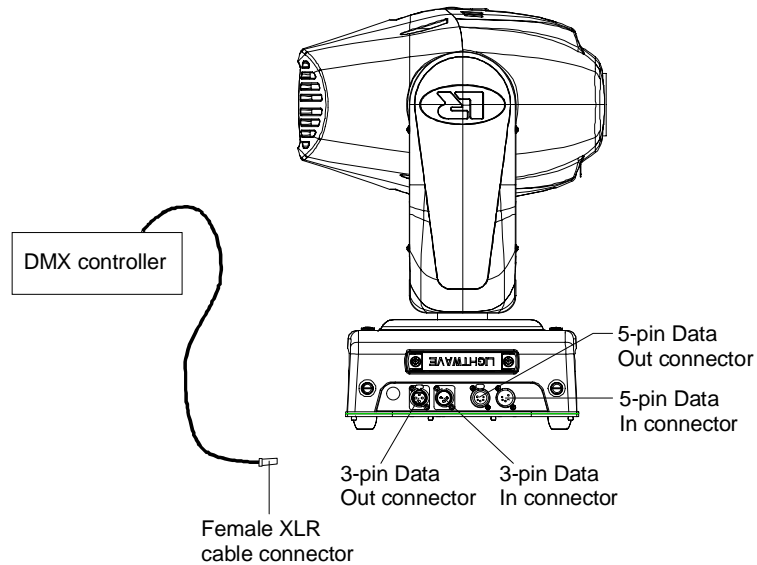
Figure 1-10. Data In and Data Out connectors on the fixture's side panel.

3. Continue using this method to link the remaining fixtures together by connecting a male XLR cable connector (with attached data cable) to one fixture's Data Out connector and the female XLR cable connector *of the same data cable* to the next fixture's Data In connector (see Figure 1-11).

See "DMX Start Channels" on page A-1 for information on how many fixtures can be connected per link.

⚠ **Caution: Do *not* connect more than one Data In and one Data Out connector to each fixture.**
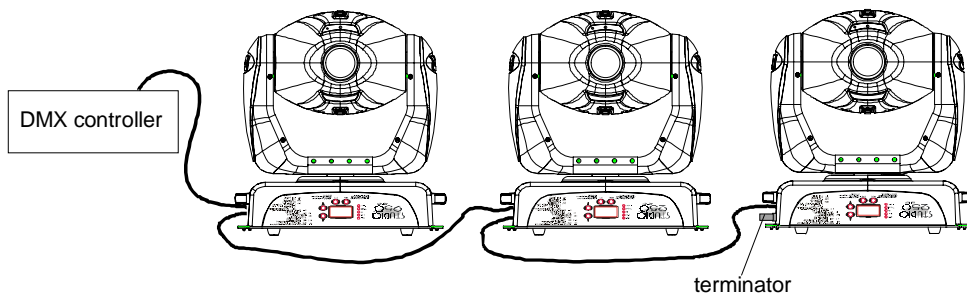
Figure 1-11. Linking the fixtures.

4. Connect a male terminator to the Data Out connector of the last fixture in the link (see Figure 1-11). For information on obtaining a terminator, see "Constructing a Terminator" on page 1-11.

   Note: Controllers, serial data distributors, data line optoisolators, and any fixtures using the RS-422 DMX standard of serial communications (including Dataflash® AF1000 xenon strobes, Intellabeam® fixtures, and Emulator® laser simulators) block software uploads or crossloads on a link. Therefore, make sure you either put all of these devices *after* the Studio Spot 250 or Studio Color 250 fixtures on the link, or bypass these devices when you perform software uploads or crossloads.

Constructing a Terminator

You must install a 120 ohm, 1/4 watt (minimum) terminator in the fixture's Data Out (female) cable connector in the *last* fixture on each DMX link. A terminator on the last fixture of the link prevents data reflection, which can corrupt the data communication on the link.

You can either purchase a terminator from your High End Systems dealer/distributor (see "Optional Accessories" on page intro-8), or you can follow the instructions below to construct a terminator.

To construct a terminator:

1. Obtain a male 3-pin or 5-pin XLR connector.

2. Disassemble the connector.

3. Solder a 120 ohm resistor, minimum of 1/4 watt, between pins two and three (see Figure 1-12)

4. Reassemble the XLR connector.

3-pin terminator   5-pin terminator
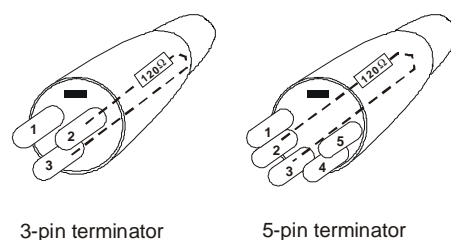
Figure 1-12. Data cable terminator.

Mounting the Fixture

Warnings: **Equipment suitable for dry locations only. Do not expose this equipment to rain or moisture.**
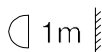
Maintain a minimum distance of 1 m (3.28 ft.) from combustible materials.

Maintain a minimum distance of 1 m (3.28 ft.) from lighted object. This means the fixture must be positioned at least 1 meter away from the object it is illuminating.

Do not mount on a flammable surface.

Use a secondary safety cable when mounting this fixture.

You can mount Studio Spot 250 or Studio Color 250 fixtures either upright (on the fixture's base) or in any orientation suspended from a support system (such as a truss). Follow the instructions below for the mounting orientation you choose.

Mounting the Fixture Upright

To mount the fixture upright, make sure that all four rubber feet are installed on the fixture's base (see Figure 1-13) and place the fixture on a sturdy, stable surface. If the surface is above floor height, use safety cables to secure the fixture to the surface (see "Safety Cable" on page 1-13).

Install the safety cable(s) by looping the cables around a support on the surface, through the side holes in the fixture's base, and around the fixture's handles (see Figure 1-14). Make sure the support and cables can support the weight of the fixture (see "Physical Specifications" on page intro-4).
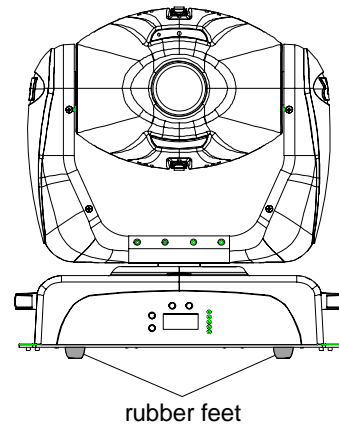
rubber feet

Figure 1-13. Rubber feet on the fixture.

⚠ **Caution: Do not mount the fixture upright without the four rubber feet installed.**

Mounting the Fixture on a Truss

You will need:
 • safety cables (2)
 • clamps (2)
 • locking washers (2)
 • truss or other support system

Truss or Other Support System

If you are mounting the fixture(s) on a truss or another type of support, verify the truss or support will handle the weight of *all* the devices you are mounting. The Studio Spot 250 and Studio Color 250 fixture weights are listed in the section titled "Physical Specifications" on page intro-4.

Safety Cable

High End Systems strongly recommends that you use safety cable when mounting any fixture. You must supply your own safety cable and verify the cable is capable of supporting the weight of the fixture. You can order galvanized safety cables from your High End Systems dealer/distributor (see "Optional Accessories" on page intro-8).

Clamp

You must supply your own clamps and verify the clamp is capable of supporting the weight of the fixture. You can order deluxe C-clamps for a two-inch truss from your High End Systems dealer/distributor (see "Optional Accessories" on page intro-8).

> Note: Due to the wide variety of possible lighting designs, High End Systems cannot make specific mounting recommendations. Consider the following procedure as a *suggested guideline* only.

Suggested mounting procedure:

1. Unplug the fixture. If the fixture has been operating, allow the fixture to cool before handling.

2. Use two people to mount each fixture: one person to hold the fixture while it is being secured in place, and one person to secure the fixture to its support and attach safety cables.

   Always stand on a firm, stable surface when mounting a fixture to its support. The fixture should be at a height where you can comfortably work on it, and should either be resting on a stable surface, or held in a stable manner. *Do not allow one person to both support and mount the fixture*.

3. Attach suitable clamps through the center holes on the base of the fixture (see Figure 1-14). *Use locking washers when attaching the clamps to the fixture's base*.
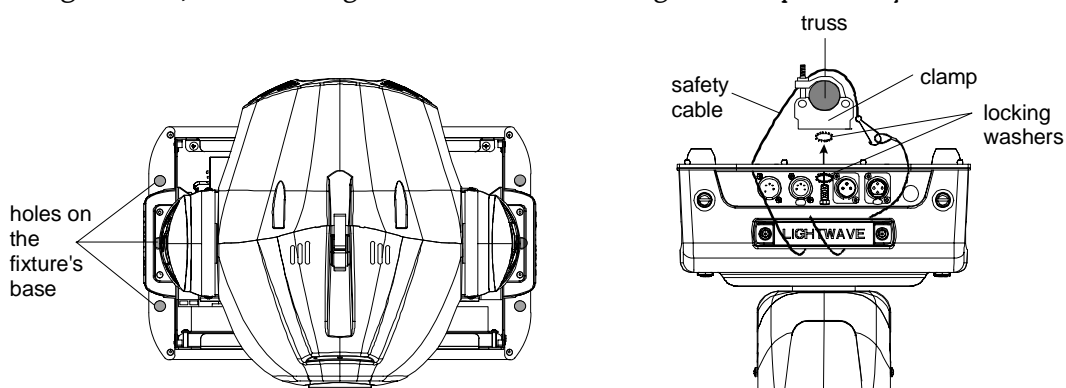
Figure 1-14. Attaching a clamp and safety cable to the fixture.

4. Tighten the clamps firmly to the fixture's base and to the support.

5. Loop one or more suitable safety cables around the support, through the side holes in the fixture's base, and around the fixture's handles (see Figure 1-14).

Chapter 2
Configuring the Fixture

This chapter explains how to configure your fixture for operation by selecting a control method and assigning a fixture address (either a DMX start channel or fixture number).

Configuring your fixture requires you to access the fixture's menu system via the alphanumeric LED display and four menu navigation buttons on the fixture's front panel (see Figure 2-1). For a detailed description of the menu system, see "Chapter 4 Understanding the Menu System" on page 4-1.

alphanumeric LED display

<Up> arrow button: scroll upward through menu items or options

<Down> arrow button: scroll downward through menu items or options

MENU   ENTER

<Menu> button: move back to the previous menu level
(press and hold to enter the menu system)

<Enter> button: select the curent menu item or option
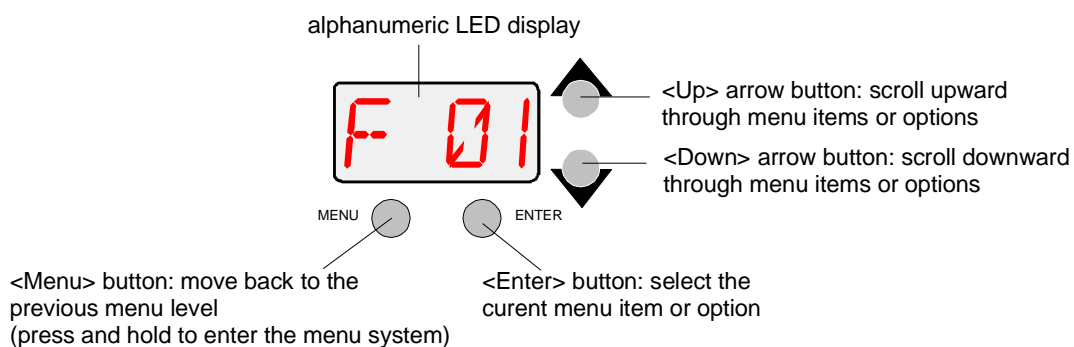
Figure 2-1. Menu navigation buttons.

Fixture Types

Each fixture type (either Studio Spot 250 or Studio Color 250) uses a fixture-specific protocol which determines the number of DMX channels the fixture will use. Your fixture is shipped from the factory set to the correct fixture type. However, if the fixture's logic board is ever replaced, you must ensure the new board is set to the correct fixture type (see "Setting the Fixture Type (TYPE)" on page 4-25).

Available fixture types and the number of DMX channels used per fixture are listed below:

- **SPOT** - for use with Studio Spot 250 fixtures only. This protocol uses 18 DMX channels per fixture.

- **COLR** - for use with Studio Color 250 fixtures only. This protocol uses 15 DMX channels per fixture.

Selecting a Control Method

You must select a control method for each Studio Spot 250 and Studio Color 250 fixture: either a DMX start channel (recommended) or a fixture number (for a link with fixtures that all use the same number of DMX channels).

> Note: Once you choose a control method, you should use that same control method for *all* the fixtures on a link.

DMX Start Channel Control Method

If you plan to combine different types of devices (and/or protocols) that use different numbers of channels on one DMX link, you should use the DMX start channel control method. Using the DMX start channel method to control your fixtures allows you to assign an explicit start channel to each fixture, so no DMX channels are wasted. For more information, see "Wasted DMX Channels" on page 2-6.

To select the DMX start channel control method:

AddR 1. Press and hold the <Menu> button until "ADDR" appears on the LED display.

SET 2. Using the <Up> and <Down> arrow buttons, scroll to the "SET" menu and press the <Enter> button to select the "SET" menu.

CHNL 3. Using the <Up> and <Down> arrow buttons, scroll to the "CHNL" menu and press the <Enter> button to select the "CHNL" menu.

dMX 4. Using the <Up> and <Down> arrow buttons, scroll to the "DMX" option and press the <Enter> button to select the "DMX" option.

> Note: You must select a control method for *each* Studio Spot 250 or Studio Color 250 fixture on the link.

Fixture Number Control Method

When you use the fixture number control method, each fixture "thinks" all other devices on the link use the *same* number of DMX channels that it uses. Therefore, using the fixture number control method is a good idea *only* if you plan to link fixtures that all use the same number of DMX channels.

For example, assign fixture numbers if you have a link that *only* controls Studio Spot 250 fixtures (or other devices that use 18 DMX channels), or a link that *only* controls Studio Color 250 fixtures (or other devices that use 15 channels per link).

To select the fixture number control method:

`AddR`   1. Press and hold the <Menu> button until "ADDR" appears on the LED display.

`SET`   2. Using the <Up> and <Down> arrow buttons, scroll to the "SET" menu and press the <Enter> button to select the "SET" menu.

`CHNL`   3. Using the <Up> and <Down> arrow buttons, scroll to the "CHNL" menu and press the <Enter> button to select the "CHNL" menu.

`AddR`   4. Using the <Up> and <Down> arrow buttons, scroll to the "ADDR" option and press the <Enter> button to select the "ADDR" option.

Note: You must select a control method for *each* Studio Spot 250 or Studio Color 250 fixture on the link.

Assigning a Fixture Address

The fixture's address identifies each fixture's channel range on the DMX link. After you have selected a control method, you must assign a DMX start channel or fixture number to each fixture:

- If you chose the DMX start channel control method for the fixture, you must assign each fixture a DMX start channel.

- If you chose the fixture number control method, you must assign each fixture a fixture number.

You must assign a *unique* fixture address to each fixture that you want to respond *independently* to controller commands. If you want two or more fixtures to respond to controller commands in exactly the same way, all fixtures must be the same type (for example two Studio Spot 250 fixtures) and must share the *entire* channel range.

Channel Range

There are 512 available channels on each DMX link. These 512 channels are divided among *all* the devices in a particular link. The number of channels each fixture requires is called the fixture's channel range. The size of each fixture's channel range is determined by the fixture type (see "Fixture Types" on page 2-1).

Each Studio Spot 250 fixture reserves a block of 18 contiguous channels. Each Studio Color 250 fixture reserves a block of 15 contiguous channels. Therefore, you can control up to 28 Studio Spot 250 fixtures (512 DMX channels available / 18 channels

used by Studio Spot 250 = 28.4 fixtures per link) or up to 32 Studio Color 250 fixtures**.

> ***Note:** Although there are enough available DMX channels to link up to 34 Studio Color 250 fixtures, you must use a DMX splitter to connect more than 32 fixtures per link. The 32 device limit complies with the EIA-485 standard. Connecting more than 32 devices per link without a DMX splitter will eventually deteriorate the digital signal.

The fixture's channel range must not overlap any other device's channel range on the link. When two devices on the same DMX link have overlapping channel ranges, one or both devices will be disabled or behave erratically.

> **Note:** The single exception to the non-overlapping rule is if the fixtures are the same type (for example two Studio Spot 250 fixtures) and share the *entire* channel range.

Determining the Unique DMX Start Channel

The DMX start channel is the first channel available to a fixture in its channel range. To determine each fixture's DMX start channel in a link, you must know the number of channels used by each fixture (see "Fixture Types" on page 2-1).

Knowing that the first fixture on the link will use DMX start channel 1, you can determine the DMX start channel for each successive fixture by adding the number of DMX channels used by the fixture to the fixture's DMX start channel. For example, in Table 2-1, 18 (channels used by the Studio Spot 250) + 1 (DMX start channel for the first fixture) = 19 (DMX start channel for the next fixture on the link).

Table 2-1. Example: Determining the DMX Start Channel

Fixture location on the link*	Fixture name	Number of DMX channels used per fixture	DMX start channel	Channel range used
First	Studio Spot 250	18 channels	C001	1-18
Second	Studio Spot 250	18 channels	C019	19-36
Third	Studio Color 250	15 channels	C037	37-51
Fourth	Other Device (using 14 channels)	14 channels	C052	52-65
Fifth	Studio Color 250	15 channels	C066	66-80

> ***Note:** The fixture location on the link does not have to comply with this example. The fixtures can be addressed in any order on the link.

To assign a unique DMX start channel for the fixture:

`RddR`

1. Press and hold the <Menu> button until "ADDR" appears on the LED display.

2. Press the <Enter> button to enter the "ADDR" menu.

`C001`
to
`C512`

3. Using the <Up> and <Down> arrow buttons, scroll to the desired DMX start channel and press the <Enter> button to select the desired DMX start channel.

Note: You must assign a unique fixture address to *each* Studio Spot 250 or Studio Color 250 fixture that you wish to respond independently to controller commands.

Determining the Unique Fixture Number

The fixture number is a number you assign that represents each unique fixture's channel range in the DMX 512 link. If you are using one DMX link to control fixtures which all use the same number of DMX channels (as recommended), you can assign fixture numbers in ascending order (see Table 2-2).

Table 2-2. Example: Determining the Unique Fixture Number

Fixture location on the link	Fixture name	Number of DMX channels used per fixture	Fixture number	Channel range used
First	Studio Spot 250	18 channels	F 01	1-18
Second	Studio Spot 250	18 channels	F 02	19-36
Third	Studio Spot 250	18 channels	F 03	37-54
Fourth	Other device (using 18 channels)	18 channels	F 04	55-72

To assign a unique fixture number to your fixture:

`RddR`

1. Press and hold the <Menu> button until "ADDR" appears on the LED display.

2. Press the <Enter> button to enter the "ADDR" menu.

`F 01`
to
`F 42`

3. Using the <Up> and <Down> arrow buttons, scroll to the desired fixture number and press the <Enter> button.

Note: You must assign a unique fixture address to *each* Studio Spot 250 or Studio Color 250 fixture that you wish to respond independently to controller commands.

Wasted DMX Channels

If you mix different types of devices (which use different numbers of channel ranges) on the same DMX link and assign fixture numbers (instead of DMX start channels) to these devices, you would waste DMX channels.

For example, in Table 2-3, if you assigned fixture number 2 (F 02) to the Studio Color 250 fixture, it would assume that all other fixtures on the link are also using 15 DMX channels, so it will erroneously try to receive channel 16 as the first channel in its channel range. This would create channel overlapping because fixture number 1 (Studio Spot 250) is already using channel 16 in its 18-channel range.

In this example, to prevent overlapping channels, you must assign fixture number 3 (F 03) to the Studio Color 250, even though it is physically the second fixture on the DMX link. While this would prevent overlapping channels, it would result in wasted channels that could not be used (see Table 2-3).

Table 2-3. Example of Wasted DMX Channels

Fixture location on the link	Fixture name	Number of DMX channels used per fixture	Fixture number: DMX channel range used (to prevent overlapping)	Resulting channels wasted
First	Studio Spot 250	18 channels	**F 01** : 01-18	
Second	Studio Color 250	15 channels	**F 03** : 31-45	12 channels wasted (19-30)
Third	Studio Spot 250	18 channels	**F 05** : 55-72	9 channels wasted (46-54)
Fourth	Studio Spot 250	18 channels	**F 07** : 73-90	

Therefore, if you choose to assign fixture numbers to different types of devices (and/or protocols) on the same DMX link, refer to "DMX Start Channels" on page A-1, which shows the channel ranges reserved for Studio Spot 250 and Studio Color 250 fixtures. This table will help you determine the next available DMX start channel/fixture number for successive Studio Spot 250 or Studio Color 250 fixtures on the link.

Chapter 3
Operating the Fixture

Studio Spot 250 and Studio Color 250 fixtures can be operated either with a DMX-compatible controller or with preset programming (using on-board scene memory for stand alone operation). This chapter provides fixture construct explanations to help you program your fixture with a DMX controller.

For information on stand alone operation, see "Chapter 5 Preset Programming" on page 5-1.

3

Programming Overview

Using a DMX controller, you can program an unlimited number of sequences and retain direct control over the Studio Spot 250 and Studio Color 250 fixtures at all times. You may choose to save time by programming your fixtures using a controller and then capturing the scene(s) to the on-board memory of multiple Studio Spot 250 or Studio Color 250 fixtures.

> Note: Because controllers cannot transmit crossfade (XFAD) or delay (DLAY) construct values, you must use preset programming to manually set those construct values for each fixture.

You can use either a controller or the fixture's on-board memory to create and play back scenes, but not both at the same time. In other words, you cannot create a scene using the on-board memory and play it back using a controller. You also cannot use a controller at the same time on-board scenes are playing.

The Status Cue® Lighting Console is the DMX controller available from High End Systems that controls Studio Spot 250 and Studio Color 250 fixtures (see "Optional Accessories" on page intro-8). For more information on whether your DMX controller will support Studio Spot 250 and Studio Color 250 fixtures, contact the controller's vendor. For more information on operating your fixture with a controller (or control device such as DMX control software), consult the documentation provided with the controller and Appendix A in this manual for DMX channel assignments and construct parameters.

Programming With a DMX Controller

When you program your fixtures with a DMX controller, you are assigning a DMX value to each of the fixture's constructs. A construct is a specific feature of the fixture that helps to design the "look" of the light beam (such as the color, effect, or focus).

For controller values for each construct setting, see "Studio Spot™ 250 Construct Parameters" on page A-2 or "Studio Color® 250 Construct Parameters" on page A-9.

Fixture Constructs

The constructs available for each fixture type are listed in Table 3-1 and described in detail in this section.

Table 3-1. Fixture Constructs and Channel Assignments

Fixture Type	Construct	DMX Channel
Studio Spot 250	Pan - High Resolution	1
	Pan - Low Resolution	2
	Tilt - High Resolution	3
	Tilt - Low Resolution	4
	Color Function	5
	Color Position	6
	Litho Function	7
	Litho Position	8
	Litho Rotate	9
	Effects Position	10
	Effects Rotate	11
	Focus	12
	Iris	13
	Shutter	14
	Dim	15
	MSpeed	16
	Macro/LAD™	17
	Control	18

Table 3-1. Fixture Constructs and Channel Assignments

Fixture Type	Construct	DMX Channel
Studio Color 250	Pan Coarse	1
	Pan Fine	2
	Tilt Coarse	3
	Tilt Fine	4
	Color Function	5
	Cyan	6
	Magenta	7
	Yellow	8
	Beam Shaping	9
	Focus	10
	Shutter	11
	Dim	12
	MSpeed	13
	Macro/LAD™	14
	Control	15

Pan and Tilt

The Pan and Tilt constructs are available for both Studio Spot 250 and Studio Color 250 fixtures. Both fixtures offer 570° pan and 270° tilt motion. DMX channels 1 and 3 allow coarse positioning to approximately one degree of the desired pan and tilt position. DMX channels 2 and 4 allow fine positioning to a fraction of a degree of the desired pan and tilt position.

By default, the pan/tilt motion of Studio Spot 250 and Studio Color 250 fixtures is controlled with MSpeed values. If you choose to control the Pan and Tilt constructs with DMX controller crossfading, you must use the Control construct to set pan/tilt MSpeed off (see "Control" on page 3-14).

Note: Optical encoders for pan and tilt instantly correct the fixture's position if the fixture is jarred from its programmed position. If a physical obstruction prevents the fixture from correcting its position, the fixture will "time out" to prevent wear on the motors. If your fixture has timed out, remove the obstruction and home the fixture to return it to normal operation.

Color Function

The Color Function construct is available for both Studio Spot 250 and Studio Color 250 fixtures and is controlled with DMX channel 5. This construct determines how the Studio Spot 250 color wheel or the Studio Color 250 cyan, magenta, and yellow color wheels move. The Color Function construct values can be enabled in either full speed (controller crossfading the wheel positions), or MSpeed (MSpeed control of the wheel motor). For more information on MSpeed, see "MSpeed (Motor Speed)" on page 3-13.

The color function settings are listed in Table 3-2.

Table 3-2. Color Function Settings

Fixture Type	Color Function	Description
Studio Spot 250	Indexed	Allows the color wheel to take the quickest path and snap to the chosen whole or half color.
	Forward Spin	Allows a forward color wheel spin at variable speeds.
	Reverse Spin	Allows a reverse color wheel spin at variable speeds.
	Continuous	Allows positioning at any point on the color wheel (allows for a smaller "step" between color wheel positions for color crossfades).
	Slow Scan	Performs a slow scan of one full color wheel position from each side of the selected whole or half color.
	Fast Scan	Performs a fast scan of one full color wheel position from each side of the selected whole or half color.
	Random	Selects random whole color positions at variable speeds.
	Blink-indexed	Closes then reopens the shutter between indexed color changes.
Studio Color 250	Continuous	Allows positioning at any point on the cyan, magenta, and yellow color wheels (allows for a smaller "step" between color wheel positions for color crossfades).
	Indexed	Divides the cyan, magenta, and yellow color wheels into eight equal sections.
	Pure Mix	Accesses only the portion of the cyan, magenta, and yellow color wheel used for color mixing.
	Spin	Puts all three (cyan, magenta, and yellow) color wheels in spin mode.
	Cycle	Uses only the color-mixing portion of the cyan, magenta, and yellow color wheels to cycle colors from red to green to blue at variable speeds (rate set by cyan DMX channel).
	TBD	*Reserved for future use.*
	Random	Performs a random color chase of 12 factory-selected colors using the cyan, magenta, and yellow color wheels at variable speeds (rate set by cyan DMX channel).
	Blink-indexed	Closes then reopens the shutter between indexed color changes.

Cyan

The Cyan construct is available only for Studio Color 250 fixtures and is controlled with DMX channel 6. This construct determines how the cyan color wheel moves. The cyan wheel settings available are determined by the Color Function construct value you chose (see Table 3-3).
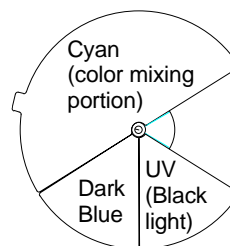
Figure 3-1. Studio Color® 250 cyan color wheel.

Table 3-3. Cyan Settings

Color Function Chosen	Cyan Setting Available	Description
Continuous	Continuous Mode	Allows exact positioning of the cyan color wheel.
Indexed or Blink-index	Indexed Mode	Allows positioning on the cyan color wheel in one of eight available sections.
Pure Mix	Pure Mix Mode	Allows exact positioning within the color mixing section of the cyan color wheel.
Spin	Spin Mode	Determines the cyan color wheel spin speed, direction, or fixed position.
Cycle or Random	Cycle & Random Mode	Determines the speed at which all three (cyan, magenta, and yellow) color wheels move to the next cycle color or random color.

Magenta

The Magenta construct is available only for Studio Color 250 fixtures and is controlled with DMX channel 7. This construct determines how the magenta color wheel moves. The magenta settings available are determined by the Color Function you chose (see Table 3-4).
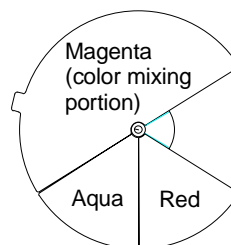
Figure 3-2. Studio Color® 250 magenta color wheel.

Table 3-4. Magenta Settings

Color Function Chosen	Magenta Setting Available	Description
Continuous	Continuous Mode	Allows exact positioning of the magenta color wheel.
Indexed or Blink-index	Indexed Mode	Allows positioning on the magenta color wheel in one of eight available sections.

Table 3-4. Magenta Settings

Color Function Chosen	Magenta Setting Available	Description
Pure Mix	Pure Mix Mode	Allows exact positioning within the color mixing section of the magenta color wheel.
Spin	Spin Mode	Determines the magenta color wheel spin speed, direction, or fixed position.

Yellow

The Yellow construct is available only for Studio Color 250 fixtures and is controlled with DMX channel 8. This construct determines how the yellow color wheel moves. The yellow settings available are determined by the Color Function you chose (see Table 3-5).
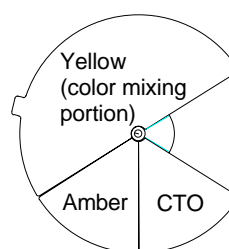
Figure 3-3. Studio Color® 250 yellow color wheel.

Table 3-5. Yellow Settings

Color Function Chosen	Magenta Setting Available	Description
Continuous	Continuous Mode	Allows exact positioning of the yellow color wheel.
Indexed or Blink-index	Indexed Mode	Allows positioning on the yellow color wheel in one of eight available sections.
Pure Mix	Pure Mix Mode	Allows exact positioning within the color mixing section of the yellow color wheel.
Spin	Spin Mode	Determines the yellow color wheel spin speed, direction, or fixed position.

Beam Shaping

The Beam Shaping construct is available only for Studio Color 250 fixtures and is controlled with DMX channel 9. This construct determines how the lenticular wheel moves. The beam shaping settings are listed in Table 3-6.

Table 3-6. Beam Shaping Settings

Beam Shaping Setting	Description
Continuous Positioning	Allows positioning at any point on the lenticular wheel.
Spin Reverse Fastest	Determines how fast the lenticular wheel will spin in reverse.
Spin Reverse Slowest	Determines how fast the lenticular wheel will spin in reverse.

Table 3-6. Beam Shaping Settings

Beam Shaping Setting	Description
Spin Stop	Stops the lenticular wheel from spinning.
Spin Forward Fastest	Determines how fast the lenticular wheel will spin forward.
Spin Forward Slowest	Determines how fast the lenticular wheel will spin forward.
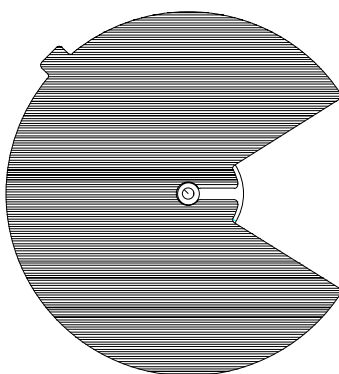
Figure 3-4. Studio Color® 250 beam shaping (lenticular) wheel.

Color Position

The Color Position construct is available only for Studio Spot 250 fixtures and is controlled with DMX channel 6. This construct allows you to choose a color wheel position (see Figure 3-5).
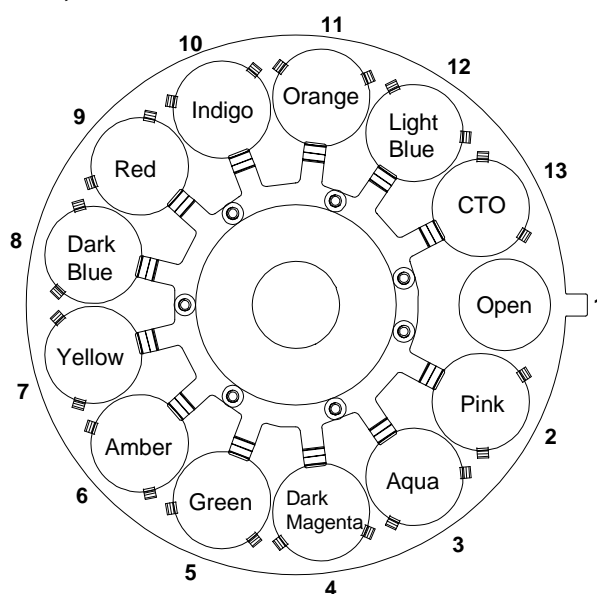
Figure 3-5. Studio Spot™ 250 color wheel.

The color positions available are determined by the Color Function construct value you chose (see Table 3-7).

Table 3-7. Color Position Settings

Color Function Chosen	Color Position Available	Description
Indexed, Slow Scan, Fast Scan, or Blink-Indexed	Indexed Mode	Selects a specified whole or half color.
Continuous	Continuously Variable Mode	Allows exact positioning of the color wheel.
Forward Spin	Continuously Variable Forward Spin Mode	Determines how fast the color wheel will spin forward.
Reverse Spin	Continuously Variable Reverse Spin Mode	Determines how fast the color wheel will spin in reverse.
Random	Random Mode	Determines how fast the color wheel will randomly change colors.

Litho Function

The Litho Function construct is available only for Studio Spot 250 fixtures and is controlled with DMX channel 7. This construct determines how the litho wheel moves. The Litho Function construct values can be enabled in either full speed (controller crossfading the wheel positions), or MSpeed (MSpeed control of the wheel motor). Studio Spot 250 Litho Function constructs are listed in Table 3-8.

Table 3-8. Litho Function Settings

Litho Function	Description
Indexed	Allows the litho wheel to take the quickest path and snap to the chosen litho.
Forward Rotate	Allows the selected litho to rotate forward (within the litho wheel) at variable speeds.
Reverse Rotate	Allows the selected litho to rotate in reverse (within the litho wheel) at variable speeds.
Wheel Spin	Allows a forward litho wheel spin at variable speeds.
Scanning	Performs a scan of one full litho wheel position from each side of the selected litho.
Random	Selects random litho (wheel) positions at variable speeds.
Blink Wheel	Closes and opens the shutter between indexed litho wheel changes.
Blink Aperture	Closes and opens the shutter between litho wheel changes or litho rotations (within the wheel).

Litho Position

The Litho Position construct is available only for Studio Spot 250 fixtures and is controlled with DMX channel 8. This construct allows you to choose a litho wheel position (see Figure 3-6).
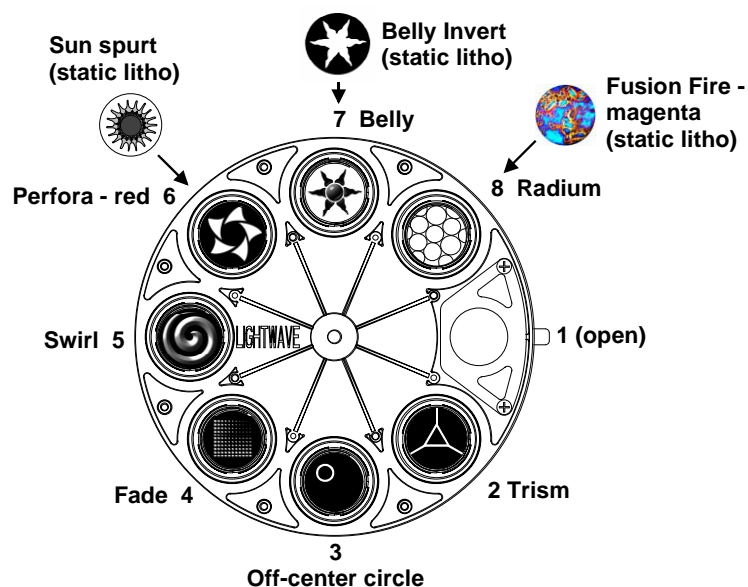
Figure 3-6. Studio Spot™ 250 litho wheel.

There are two kinds of lithos in the litho wheel: a *rotating litho* and a *static litho* (located directly behind the rotating litho). To produce different types of effects (either moiré or morphing), you can change the orientation of a rotating litho *that has a static litho behind it*. For more information, see "Replacing Lithos" on page 7-9.

Litho Rotate

The Litho Rotate construct is available only for Studio Spot 250 fixtures and is controlled with DMX channel 9. The litho rotate settings available are determined by the Litho Function construct value you chose (see Table 3-9).

Table 3-9. Litho Rotate Settings

Litho Function Chosen	Litho Rotate Available	Description
Indexed, Blink Wheel, or Blink Aperture	Indexed Mode	Rotates the specified indexed litho from 0° to 360°.
Forward Rotate	Continuously Variable Forward Rotate Mode	Determines how fast the specified litho will spin forward (within the wheel).

Table 3-9. Litho Rotate Settings

Litho Function Chosen	Litho Rotate Available	Description
Reverse Rotate	Continuously Variable Reverse Rotate Mode	Determines how fast the specified litho will spin in reverse (within the wheel).
Wheel Spin	Continuously Variable Wheel Spin Mode	Determines the speed and direction the litho wheel will spin.
Scanning	Scan Mode	Determines how fast the litho wheel will scan between one full litho wheel position from each side of the selected litho.
Random	Random Mode	Determines how fast the litho wheel will randomly change positions.

Effects

The Effects construct is available only for Studio Spot 250 fixtures and is controlled with DMX channel 10. This construct allows you to choose an effects wheel position (see Figure 3-7).
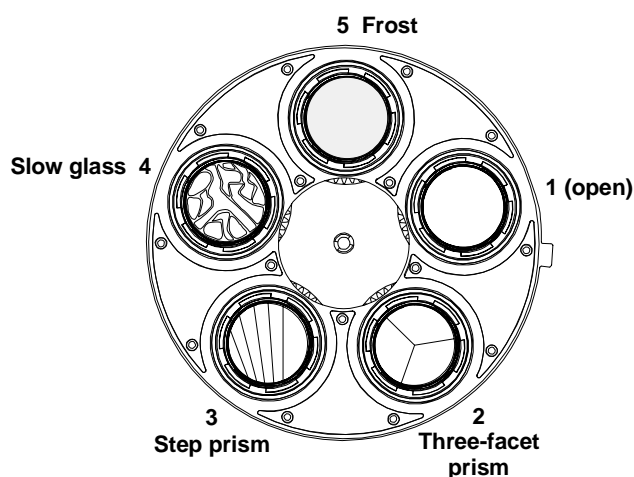

Figure 3-7. Studio Spot™ 250 effects wheel.

The effects wheel positions can be enabled in either full speed (controller crossfading the wheel positions), or MSpeed (MSpeed control of the wheel motor).

Effects Rotate

The Effects Rotate construct is available only for Studio Spot 250 fixtures and is controlled with DMX channel 11. The effects rotate settings are listed in Table 3-10.

Table 3-10. Effects Rotate Settings

Effects Rotate Setting	Description
Forward Rotate	Determines how fast the specified effect will spin forward (within the wheel).
Rotate Stop	Stops the specified effect from spinning (within the wheel).
Reverse Rotate	Determines how fast the specified effect will spin in reverse (within the wheel).

Focus

3

The Focus construct is available for both Studio Spot 250 and Studio Color 250 fixtures. This construct is controlled with DMX channel 12 for Studio Spot 250 fixtures or DMX channel 10 for Studio Color 250 fixtures.

In Studio Spot 250 fixtures, the variable focus construct moves the lens inside the fixture to allow you to focus on a close image (construct value of 0) or on an image farther away (construct value of 255).

In Studio Color 250 fixtures, the Focus construct uses the motorized zoom to change the beam angle from 21° (construct value of 0) to 25° (construct value of 255).

> Note: When adjusting the focus on Studio Spot 250 fixtures, you can focus on the litho wheel or the effects wheel to create different patterns and/or effects.

Iris

The Iris construct is available only for Studio Spot 250 fixtures and is controlled with DMX channel 13. The iris settings are listed in Table 3-11.

Table 3-11. Iris Settings

Iris Setting	Description
Close	Closes the iris.
Variable Iris	Determines the diameter of the beam.
Open	Fully opens the iris.*
Periodic Strobe (Variable)	Strobes the beam diameter at specified intervals.
Random Strobe (Variable)	Strobes the beam diameter at random intervals.
Ramp Open/Snap Shut (Variable)	Fully opens the iris at variable speeds, then snaps shut at full speed.

Table 3-11. Iris Settings

Iris Setting	Description
Snap Open/Ramp Shut (Variable)	Fully opens the iris at full speed, then ramps shut at variable speeds.
Ramp Open/Ramp Shut (Variable)	Fully opens the iris at variable speeds, then shuts at the same chosen speed.
Random Ramp/Snap (Variable)	Fully opens the iris at variable, random speeds, then snaps shut at full speed.
Random Snap/Ramp (Variable)	Fully opens the iris at full speed, then ramp shut at variable, random speeds.
Open	Fully opens the iris.

*Note: "Open" appears twice in the Iris construct to act as a barrier between the Variable Iris and Strobe parameters, and to allow "full white" when all DMX controller constructs are set to the highest values.

Shutter

The Shutter construct is available for both Studio Spot 250 and Studio Color 250 fixtures. This construct is controlled with DMX channel 14 for Studio Spot 250 fixtures or DMX channel 11 for Studio Color 250 fixtures. The shutter settings are listed in Table 3-12.

Table 3-12. Shutter Settings

Shutter Setting	Description
Close	Closes the shutter.
Periodic Strobe (Variable)	Strobes the beam at specified intervals.
Random/Rand Strobe (Variable)	Strobes the beam randomly.
Random/Sync (Variable)	Strobes the beam randomly in synchronization with the random strobing of all other Studio Spot 250 and Studio Color 250 fixtures using the same DMX controller.
Ramp Open/Snap Shut (Variable)	Opens the shutter at variable speeds, then snaps shut at full speed.
Snap Open/Ramp Shut (Variable)	Opens the shutter at full speed, then shuts at variable speeds.
Ramp Open/Ramp Shut (Variable)	Opens the shutter at variable speeds, then shuts at the same chosen speed.
Random Ramp/Snap (Variable)	Opens the shutter at random speeds, then snaps shut at full speed.
Random Snap/Ramp (Variable)	Opens the shutter at full speed, then shuts at random speeds.
Open	Opens the shutter.

Dim

The Dim construct is available for both Studio Spot 250 and Studio Color 250 fixtures. This construct is controlled with DMX channel 15 for Studio Spot 250 fixtures or DMX channel 12 for Studio Color 250 fixtures. The Dim construct provides full dimming capability without changing the color temperature or the beam shape. The dim values range from closed (construct value of 0) to fully open (construct value of 255).

MSpeed (Motor Speed)

The MSpeed construct is available for both Studio Spot 250 and Studio Color 250 fixtures. This construct is controlled with DMX channel 16 for Studio Spot 250 fixtures or DMX channel 13 for Studio Color 250 fixtures. MSpeed is the time required for a motor to complete movement when changing from one position to another. MSpeed provides a means for all motors to reach their target position at the same time, even though each motor may have different distances to travel. MSpeed movement is extremely smooth because the fixture controls its own movements and is not dependent on DMX refresh rates.

MSpeed times vary from 0.15 seconds to 252.7 seconds. However, if you apply MSpeed to a construct, be sure that the delay value (length of time allowed for the entire scene) is longer than the MSpeed value to allow the motors to complete their movement before the end of the scene. An MSpeed value that is longer than the delay value could produce undesirable results - such as no light output during the scene. For a listing of exact MSpeed times, see "MSpeed Times" on page A-13.

You can apply MSpeed times for the following constructs:

- Pan*
- Tilt*
- Color Function
- Litho Function
- Effects

*Note: By default, MSpeed is applied to pan and tilt positioning. However, you can disable MSpeed for pan and tilt with the control construct (see "Control" on page 3-14).

Macro/LAD™

The Macro/LAD construct is available for both Studio Spot 250 and Studio Color 250 fixtures. This construct is controlled with DMX channel 17 for Studio Spot 250 fixtures or DMX channel 14 for Studio Color 250 fixtures.

Macros are factory-programmed sequences which allow you to quickly program complicated looks (such as a ballyhoo) in one scene. Each macro modifies a specific set of constructs, while allowing user control of all other constructs in the scene. You can also create an entire sequence by selecting the random macro which randomly plays all pre-programmed macros. For more information on which constructs are used in each macro, see "Appendix B Macros" on page B-1.

The fixture's optional Laser Aiming Device (LAD) is also controlled with this construct. Because the macros and the LAD share the same DMX channel, you cannot use both a macro and the LAD at the same time. For more information on the LAD, see "Chapter 6 Laser Aiming Device (LAD™) Operation" on page 6-1.

The macro/LAD settings are listed in Table 3-13.

Table 3-13. Macro/LAD™ Settings

Macro/LAD Setting	Description
No Macros/LAD off	Sets the Macros and LAD off.
Macro 1 through 32	Plays the chosen Macro.
Random Macros (Variable)	Plays all 32 Macros in random order at variable speeds.
LAD Off/No Macros	Sets the Macros and LAD off.
LAD Modulate (Variable)	Sets the LAD on to modulate at variable speeds.
LAD On	Sets the LAD continuously on.

Control

The Control construct is available for both Studio Spot 250 and Studio Color 250 fixtures. This construct is controlled with DMX channel 18 for Studio Spot 250 fixtures or DMX channel 15 for Studio Color 250 fixtures.

*To access all control settings (except for Pan & Tilt MSpeed Off), first select a control channel value, then set the **Shutter** channel to "0."*

Among other functions, the Control construct allows you to remotely home the fixture with a DMX controller.

⚠ **Caution: You should home the fixture *immediately* if you notice that the litho wheel has lost position (i.e. stuck between two litho patterns). If the litho wheel is not correctly aligned in the optical path, the wheel could be damaged.**

The control settings are listed in Table 3-14.

Table 3-14. Control Settings

Control Setting	Description
Safe	Disables all Control settings for normal operation.
Pan & Tilt MSpeed Off	Sets Pan & Tilt MSpeed off.

Table 3-14. Control Settings

Control Setting	Description
Display Off	Sets LED display off.
Display Dim	Dims LED display characters.
Display Bright	Sets LED display on.
Home	Remotely homes the fixture.
Lamp On	Remotely restrikes the fixture's lamp.
Lamp Off	Remotely extinguishes the fixture's lamp.
Shutdown *(send this value for approximately two seconds)*	Remotely shuts down the fixture*.

*Note: Fixture shutdown allows you to remotely deactivate the fixture. When a fixture is shut down, the lamp is extinguished, power to the motors is disabled, and the LED display is turned off. If a fixture is in shutdown mode, you must home the fixture to bring it back into operation.

3

Updating Software

Updating Studio Spot 250 or Studio Color 250 software is fast and easy. The latest versions of software are provided on the High End Systems web site, and are also available through High End Systems customer service (see "Contacting High End Systems" on page ii).

Uploading Software to the Fixture

There are three ways to upload new software to your Studio Spot 250 or Studio Color 250 fixtures:

1. Attach a High End Systems Upload Dongle to your computer and upload the software to your Studio Spot 250 or Studio Color 250 fixture.

    To use a High End Systems Upload Dongle, you will need a 386-based (or faster) computer, MS DOS® version 3.3 (or later), and one MB of free disk space. To obtain an Upload Dongle (with installation and operation instructions), contact your High End Systems dealer/distributor (see "Contacting High End Systems" on page ii).

2. Crossload software from one fixture that contains the new software to all other Studio Spot 250 or Studio Color 250 fixtures on the link.

    Studio Spot 250 fixtures and Studio Color 250 fixtures use the same software. Therefore, if you have a Studio Spot 250 or Studio Color 250 fixture with newer software, you can crossload its software to all other Studio Spot 250 and

Studio Color 250 fixtures on the link. The crossloading procedure is explained in the section titled "Crossloading Fixture Software (XLD)" on page 4-28.

3. Upload the new software to all Studio Spot 250 or Studio Color 250 fixtures on the link using the Status Cue lighting console.

Refer to the Status Cue User Manual for the procedure used to upload software using a Status Cue lighting console.

Note: Remember that before you can upload new software, you must disconnect any controllers, bypass any serial data distributors and/or data line optoisolators, and bypass or make sure that any fixtures using RS-422 communications (such as Dataflash® AF1000 xenon strobes, Intellabeam® fixtures, and Emulator® laser simulators) are located *after* the Studio Spot 250 or Studio Color 250 fixtures on the link. These devices will block communication with any other Studio Spot 250 or Studio Color 250 fixtures on the link.

Regardless of the method you chose to upload software, if you receive an error during the upload, see "Upload and Crossload Troubleshooting" on page 8-9.

Chapter 4
Understanding the Menu System

Studio Spot 250 and Studio Color 250 fixtures have an intuitive menu system that allows you to:

- Configure your fixture for operation (discussed in Chapter 2)

- Access fixture options such as homing the fixture, viewing fixture status, crossloading software, and performing self tests (discussed in this chapter)

- Create, store, and play scenes from the fixture's on-board memory (see Chapter 5)

4

Navigational Buttons

You navigate through the menu system using the display navigation buttons on the alphanumeric LED display (see Figure 4-1). As you navigate the menu system, the LED display will show the menu items you select from the menu map.
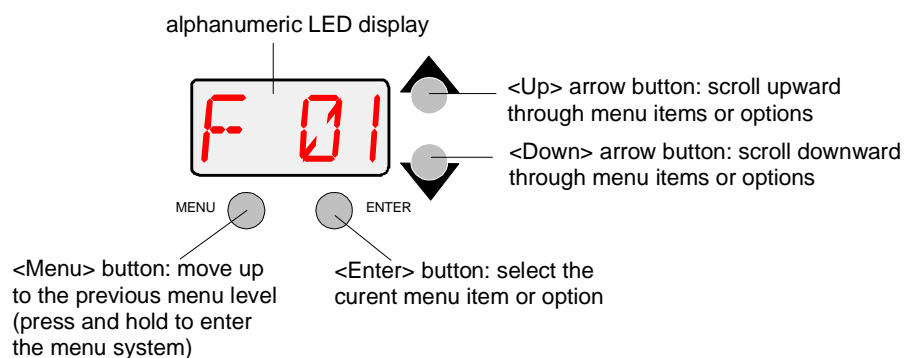
Figure 4-1. Use the <Menu>, <Enter>, <Up>, and <Down> keys to navigate through the menu system.

The alphanumeric display will flash when a new option is *selected* (by pressing the <Up> and <Down> arrow buttons), and will stop flashing when a new option is *entered* (by pressing the <Enter> button).

> Note: If you do not press the <Enter> button, the new option you selected will not be stored.

Pressing the <Menu> button returns you to the previous option or menu *without changing* the value of an option.

Accessing the Menu System

To access the menu system, press and hold the <Menu> key until "ADDR" appears on the LED display. The menu system is protected against inadvertent menu changes by requiring the <Menu> button to be held for a few seconds before allowing entry to the menus.

To exit the menu system, you must keep pressing the <Menu> button to back out of each menu level until "MENU" appears on the LED display. "MENU" will be replaced, after a few seconds, with the default alternating display of the fixture's software version and the fixture number/DMX start channel.

> Note: The words "AUTO" and "LOCK" will appear briefly on the display after "MENU." As mentioned above, the fixture's software is "locking" the display after you have accessed the menu system.

Menu Maps

Studio Spot™ 250 Menu Map

A complete map of the menu system for Studio Spot 250 is shown in Table 4-1. See individual subsections for descriptions of each menu item.

Table 4-1. Studio Spot™ 250 Menu Map

Menu Level 1	Menu Level 2	Menu Level 3	Menu Level 4	Menu Level 5	Description
ADDR	Fxx/Cxxx				change the existing fixture number/DMX start channel
SET	FACT	ON			set factory defaults on
		OFF			set factory defaults off
	SWAP	ON			set pan/tilt swap on
		OFF			set pan/tilt swap off
	T/IN	ON			set tilt invert on
		OFF			set tilt invert off
	P/IN	ON			set pan invert on
		OFF			set pan invert off
	DSPL	ON			set LED display on

Table 4-1. Studio Spot™ 250 Menu Map

Menu Level 1	Menu Level 2	Menu Level 3	Menu Level 4	Menu Level 5	Description
SET	DSPL	OFF			set LED display off
		DIM			dim LED display
	D/IN	ON			invert LED display orientation
		OFF			set normal LED display orientation
	CHNL	ADDR			set control method to fixture number
		DMX			set control method to DMX start channel
	LMPL	ON			enable lamp hour warning message
		OFF			disable lamp hour warning message
MODE	TYPE	SPOT			set the fixture type to Studio Spot 250
		COLR			set the fixture type to Studio Color 250
	USER	A			select user A settings
		B			select user B settings
		COPY	PRST	A → B	copy user A presets to user B
				B → A	copy user B presets to user A
			SETT	A → B	copy user A settings to user B
				B → A	copy user B settings to user A
			ALL	A → B	copy user A presets and settings to user B
				B → A	copy user B presets and settings to user A
	XLD				crossload fixture software to all other Studio Spot 250 and Studio Color 250 fixtures on the link
TEST	HOME				home the fixture
	LAMP	ON			strike the lamp
		OFF			extinguish the lamp
	BOOT				copy the boot sector
	SELF	ALL			self test all constructs
		PAN			self test pan movement
		TILT			self test tilt movement
		COL			self test color wheel movement
		LTO			self test litho wheel movement
		FX			self test effects wheel movement
		FCUS			self test lens focus movement
		IRIS			self test iris movement
		SHUT			self test shutter strobe movement
		DIM			self test dim flag movement
	S/UP				place the fixture in setup mode for mechanical homing
	DISP				self test LED display
	CODE				*Factory use only*
INFO	PCB				view the current internal board temperature (C)
	HEAD				view the current internal head temperature (C)
	L/HR				view the current number of lamp hours

Table 4-1. Studio Spot™ 250 Menu Map

Menu Level 1	Menu Level 2	Menu Level 3	Menu Level 4	Menu Level 5	Description
INFO	F/HR				view the current number of fixture hours
	L/ST				view the current number of lamp strikes
	VER				view the fixture's software version
	DMX	FIXT	FE		view the number of DMX framing errors
			OV		view the number of DMX overruns
			STRT		view the DMX start code value
			PANH		view the DMX high resolution pan value
			PANL		view the DMX low resolution pan value
			TLTH		view the DMX high resolution tilt value
			TLTL		view the DMX low resolution tilt value
			COLC		view the DMX color control channel value
			COL		view the DMX color wheel position value
			LTOC		view the DMX litho control channel value
			LTO		view the DMX litho wheel position value
			LTR		view the DMX litho wheel rotation value
			FX		view the DMX effects wheel position value
			FXR		view the DMX effects wheel rotation value
			FCUS		view the DMX focus lens position value
			IRIS		view the DMX iris position value
			SHUT		view the DMX shutter strobe value
			DIM		view the DMX shutter dim flag value
			MSPD		view the DMX MSpeed time value
			MACR		view the DMX macro/LAD value
			CNTL		view the DMX control channel value
		DATA	C001 - C512		view DMX data for the selected DMX channel
	SENS	LTO			view whether the litho wheel sensor is obstructed ("ON") or is not obstructed ("OFF")
		FX			view whether the effects wheel sensor is obstructed ("ON") or is not obstructed ("OFF")
		LTR			view whether the litho wheel sensor (within the wheel) is obstructed ("ON") or is not obstructed ("OFF")
		COLR			view whether the color wheel sensor is obstructed ("ON") or is not obstructed ("OFF")
		PAN			view whether the pan sensor is obstructed ("ON") or is not obstructed ("OFF")
		TILT			view whether the tilt sensor is obstructed ("ON") or is not obstructed ("OFF")
	F/RS				reset fixture hours to zero *(press and hold the <Enter> button for 5 seconds to change the value)*
	L/RS				reset lamp hours to zero *(press and hold the <Enter> button for 5 seconds to change the value)*
	UNUM				*Customer Service use only*

Table 4-1. Studio Spot™ 250 Menu Map

Menu Level 1	Menu Level 2	Menu Level 3	Menu Level 4	Menu Level 5	Description
PRST	PLAY	OFF			set preset playback off
		ON			set preset playback on
		SCN			display which scene is currently playing
	EDIT	SN01 - SN16	SHUT	CLSD	close shutter
				P01 - P28	periodic shutter strobe at specified intervals, slow (P 01) to fast (P 28)
				NN01 - NN28	shutter strobe at random intervals, slow (NN01) to fast (NN28)
				NK01 - NK28	random shutter strobe, slow (NK01) to fast (NK28), in synchronization with the random strobing of all other Studio Spot 250/Studio Color 250 fixtures on the link
				RS01 - RS28	shutter ramp open, slow (RS01) to fast (RS28), snap shut
				SR01 - SR28	shutter snap open, ramp shut slow (SR01) to fast (SR28)
				RR01 - RR28	shutter ramp open, ramp shut slow (RR01) to fast (RR28)
				NR01 - NR28	random ramp open, slow (NR01) to fast (NR28), snap shut
				NS01 - NS28	random snap open, ramp shut slow (NS01) to fast (NS28)
				OPEN	shutter open
			DIM	D001 - D255	select a dim value from dark (D001) to bright (D255)
			PAN	-49.9 - +49.9	select a pan value from -49.9% to +49.9% of the pan range
			TILT	-49.9 - +49.9	select a tilt value from -49.9% to +49.9% of the tilt range
			COLC	IDX	color wheel indexed position (snaps to center of color/half-color), full speed
				FSP	color wheel forward spin, full speed
				RSP	color wheel reverse spin, full speed
				CON	exact positioning at any point on the color wheel, full speed
				SSC	color wheel slow scan, full speed
				FSC	color wheel fast scan, full speed
				RND	color wheel random positions, full speed
				BLK	shutter blink between indexed color wheel changes, full speed
				MIDX	color wheel indexed position (snaps to center of color/half-color), MSpeed
				MFSP	color wheel forward spin, MSpeed
				MRSP	color wheel reverse spin, MSpeed

4

Table 4-1. Studio Spot™ 250 Menu Map

Menu Level 1	Menu Level 2	Menu Level 3	Menu Level 4	Menu Level 5	Description
PRST	EDIT	SN01 - SN16	COLC	MCON	exact positioning at any point on the color wheel, MSpeed
				MSSC	color wheel slow scan, MSpeed
				MFSC	color wheel fast scan, MSpeed
				MRND	color wheel random positions, MSpeed
				MBLK	shutter blink between indexed color wheel changes, MSpeed
			COL	C 01 - C 13	select a full color, color wheel position - only available with COLC value of IDX or MIDX
				HC01 - HC13	select a half color, color wheel position - only available with COLC value of IDX or MIDX
				F001 - F255	select a color wheel forward spin speed from none (F001) to fast (F255) - only available with COLC value of FSP or MFSP
				R001 - R255	select a color wheel reverse spin speed from none (R001) to fast (R255) - only available with COLC value of RSP or MRSP
				D000 - D358	select a color wheel position in degrees from 0° (D000) to 358° (D358) - only available with COLC value of CON or MCON
				SC01 - SC26	select a full color base position (SC01 - SC13) or half color base position (SC14 - SC26) for slow scan - only available with COLC value of SSC or MSSC
				FC01 - FC26	select a full color base position (FC01 - FC13) or half color base position (FC14 - FC26) for fast scan - only available with COLC value of FSC or MFSC
				N001 - N255	select a pause time between random color wheel position changes, short (N000) to long (N255) - only available with COLC value of RND or MRND
				B 01 - B 13	select a full color wheel position with shutter blink - only available with COLC value of BLK or MBLK
				HB01 - HB13	select a half color wheel position with shutter blink - only available with COLC value of BLK or MBLK
			LTOC	IDX	litho wheel indexed position (snaps to center of litho), full speed
				FSP	litho wheel forward spin, full speed
				RSP	litho wheel reverse spin, full speed
				WSP	litho wheel spin, full speed
				FSC	scan selected litho, full speed
				RND	litho wheel random positions, full speed
				BKW	shutter blink between indexed litho wheel changes, full speed

Table 4-1. Studio Spot™ 250 Menu Map

Menu Level 1	Menu Level 2	Menu Level 3	Menu Level 4	Menu Level 5	Description
PRST	EDIT	SN01 - SN16	LTOC	BKA	shutter blink between indexed litho rotations (within the wheel), full speed
				MIDX	litho wheel indexed position (snaps to center of litho), MSpeed
				MFSP	litho wheel forward spin, MSpeed
				MRSP	litho wheel reverse spin, MSpeed
				MWSP	litho wheel spin, MSpeed
			LTO	MFSC	scan selected litho, MSpeed
				MRND	litho wheel random positions, MSpeed
				MBKW	shutter blink between indexed litho wheel changes, MSpeed
				MBKA	shutter blink between indexed litho rotations (within the wheel), MSpeed
				L 01 - L 08	select an indexed litho wheel position - only available with LTOC value of IDX or MIDX
				LF01 - LF08	select a litho wheel forward spin speed - only available with LTOC value of FSP or MFSP
				LR01 - LR08	select a litho wheel reverse spin speed - only available with LTOC value of RSP or MRSP
				WSPN	litho wheel spin - only available with LTOC value of WSP or MWSP
				SC01 - SC08	scan of selected litho base position - only available with LTOC value of FSC or MFSC
				RAND	random litho wheel spin - only available with LTOC value of RND or MRND
				BW01 - BW08	select an indexed litho position with shutter blink - only available with LTOC value of BKW or MBKW
				BA01 - BA08	select an indexed litho position (within the wheel) with shutter blink - only available with LTOC value of BKA or MBKA
			LTR	D000 - D358	select a litho angle from 0° (D000) to 358° (D358) - only available with LTOC value of IDX or MIDX
				F000 - F255	select a litho forward spin speed (within the wheel) from none (F000) to fast (F255) - only available with LTOC value of FSP or MFSP
				R000 - R255	select a litho reverse spin speed (within the wheel) from none (R000) to fast (R255) - only available with LTOC value of RSP or MRSP
				WR99 - WR01	select a litho wheel reverse spin speed from fast (WR99) to slow (WR01) - only available with LTOC value of WSP or MWSP
				WF01 - WF99	select a litho wheel forward spin speed from slow (WF01) to fast (WF99) - only available with LTOC value of WSP or MWSP

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Table 4-1. Studio Spot™ 250 Menu Map

Menu Level 1	Menu Level 2	Menu Level 3	Menu Level 4	Menu Level 5	Description
PRST	EDIT	SN01 - SN16	LTR	S000 - S255	select a litho scan speed from slow (S000) to fast (S255) - only available with LTOC value of FSC or MFSC
				N000 - N255	select a pause time between random litho selections from none (N000) to fast (N255) - only available with LTOC value of RND or MRND
				B000 - B358	select a litho rotation angle with shutter blink from 0° (B000) to 358° (B358) - only available with LTOC value of BKW, MBKW, BKA, or MBKA
			FX	FX01 - FX05	select an effects wheel position, full speed
				MFX1 - MFX5	select an effects wheel position, MSpeed
			FXR	F121 - F001	select an effect forward rotation speed (within the wheel) from slow (F121) to fast (F001)
				STIL	no effect spin (within the wheel)
				R001 - R121	select an effect reverse rotation speed (within the wheel) from slow (R001) to fast (R121)
			FCUS	000 - 255	select a lens focus value
			IRIS	CLSD	close the iris
				F001 - F127	select the beam diameter, from small (F001) to large (F127)
				OPEN	fully open the iris
				P 01 - P 16	select a speed to strobe the beam diameter, from slow (P 01) to fast (P 16)
				N 01 - N 16	select the frequency of random strobing of the beam diameter, from less often (N 01) to more often (N 16)
				RS01 - RS16	select the speed to ramp open, slow (RS01) to fast (RS16), then snap shut
				SR01 - SR16	select the speed to snap open, then ramp shut, slow (SR01) to fast (SR16)
				RR01 - RR16	select the speed to ramp open, then ramp shut, slow (RR01) to fast (RR16)
				NR01 - NR16	select the frequency of random speeds to ramp open, from less often (NS01) to more often (NS16), then snap shut
				NS01 - NS16	select the frequency of random speeds to snap open, then ramp shut from less often (NR01) to more often (NR16)
				OPEN	fully open the iris
			MSPD	0.15 - 252.7	select a motor movement time in decimal seconds from fast (0.15) to slow (252.7)

Table 4-1. Studio Spot™ 250 Menu Map

Menu Level 1	Menu Level 2	Menu Level 3	Menu Level 4	Menu Level 5	Description
PRST	EDIT	SN01 - SN16	MACR	MCOF	set all Macro/LAD options off
				MC01 - MC32	select a factory-programmed macro
				RN01 - RN32	select all 32 factory-programmed macros to play in random order at variable speeds from slow (RN01) to fast (RN32)
				LROF	set LAD off
				LM01 - LM32	modulate LAD from slow (LM01) to fast (LM32)
				LRON	set LAD continuously on
			XFAD	X 0.1 - X 9.9	select the DIM and FCUS construct's crossfade time in increments of 0.1
				X 10 - X166	select the DIM and FCUS construct's crossfade time in increments of 1
			DLAY	D 0.1 - D 9.9	select the scene delay time in increments of 0.1
				D 10 - D166	select the scene delay time in increments of 1
			TIME	SEC	select seconds as the units of time used for the XFAD and DLAY constructs
				MIN	select minutes as the units of time used for the XFAD and DLAY constructs
				HOUR	select hours as the units of time used for the XFAD and DLAY constructs
			ZERO	OK?	erase any programming of the current scene by voiding all construct values / mark the end of the loop
	COPY	FROM	FA01 - FA16		select a user A scene to copy from (source scene)
			FB01 - FB16		select a user B scene to copy from (source scene)
		TO	TA01 - TA16		select a user A scene to copy to (destination scene)
			TB01 - TB16		select a user B scene to copy to (destination scene)
	CAPT	SN01 - SN16			select a scene to capture a pre-programmed scene to (from your DMX controller)
	DFLT	OK?			enable the factory-programmed preset scene sequence - erases any preset scenes previously programmed

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Studio Color® 250 Menu Map

A complete map of the menu system for Studio Color 250 is shown in Table 4-2. See individual subsections for descriptions of each menu item.

Table 4-2. Studio Color® 250 Menu Map

Menu Level 1	Menu Level 2	Menu Level 3	Menu Level 4	Menu Level 5	Description
ADDR	Fxx/Cxxx				change the existing fixture number/DMX start channel
SET	FACT	ON			set factory defaults on
		OFF			set factory defaults off
	SWAP	ON			set pan/tilt swap on
		OFF			set pan/tilt swap off
	T/IN	ON			set tilt invert on
		OFF			set tilt invert off
	P/IN	ON			set pan invert on
		OFF			set pan invert off
	DSPL	ON			set LED display on
		OFF			set LED display off
		DIM			dim LED display
	D/IN	ON			invert LED display orientation
		OFF			set normal LED display orientation
	CHNL	ADDR			set control method to fixture number
		DMX			set control method to DMX start channel
	LMPL	ON			enable lamp hour warning message
		OFF			disable lamp hour warning message
MODE	TYPE	SPOT			set the fixture type to Studio Spot 250
		COLR			set the fixture type to Studio Color 250
	USER	A			select user A settings
		B			select user B settings
		COPY	PRST	A → B	copy user A presets to user B
				B → A	copy user B presets to user A
			SETT	A → B	copy user A settings to user B
				B → A	copy user B settings to user A
			ALL	A → B	copy user A presets and settings to user B
				B → A	copy user B presets and settings to user A
	XLD				crossload fixture software to all other Studio Spot 250 and Studio Color 250 fixtures on the link
TEST	HOME				home the fixture

Table 4-2. Studio Color® 250 Menu Map

Menu Level 1	Menu Level 2	Menu Level 3	Menu Level 4	Menu Level 5	Description
TEST	LAMP	ON			strike the lamp
		OFF			extinguish the lamp
	BOOT				copy the boot sector
	SELF	ALL			self test all constructs
		PAN			self test pan movement
		TILT			self test tilt movement
		CYAN			self test cyan color wheel movement
		MAGN			self test magenta color wheel movement
		YELW			self test yellow color wheel movement
		BEAM			self test beam shaping (Lenticular wheel) movement
		FCUS			self test lens focus movement
		SHUT			self test shutter strobe movement
		DIM			self test dim flag movement
	S/UP				place the fixture in setup mode for mechanical homing
	DISP				self test LED display
	CODE				*Factory use only*
INFO	PCB				view the current internal board temperature (C)
	HEAD				view the current internal head temperature (C)
	L/HR				view the current number of lamp hours
	F/HR				view the current number of fixture hours
	L/ST				view the current number of lamp strikes
	VER				view the fixture's software version
	DMX	FIXT	FE		view the number of DMX framing errors
			OV		view the number of DMX overruns
			STRT		view the DMX start code value
			PANH		view the DMX high resolution pan value
			PANL		view the DMX low resolution pan value
			TLTH		view the DMX high resolution tilt value
			TLTL		view the DMX low resolution tilt value
			COLC		view the DMX color control channel value
			CYAN		view the DMX cyan color wheel position value
			MAGN		view the DMX magenta color wheel position value
			YELW		view the DMX yellow color wheel position value
			BEAM		view the DMX beam shaping (lenticular) wheel position value
			FCUS		view the DMX lens focus position value
			SHUT		view the DMX shutter strobe value
			DIM		view the DMX shutter dim flag value
			MSPD		view the DMX MSpeed time value
			MACR		view the DMX macro/LAD value
			CNTL		view the DMX control channel value

Table 4-2. Studio Color® 250 Menu Map

Menu Level 1	Menu Level 2	Menu Level 3	Menu Level 4	Menu Level 5	Description
INFO	DMX	DATA	C001 - C512		view the DMX data for the selected DMX channel
	SENS	CYAN			view whether the cyan wheel sensor is obstructed ("ON") or is not obstructed ("OFF")
		BEAM			view whether the beam shaping (lenticular) wheel sensor is obstructed ("ON") or is not obstructed ("OFF")
		YELW			view whether the yellow wheel sensor is obstructed ("ON") or is not obstructed ("OFF")
		MAGN			view whether the magenta wheel sensor is obstructed ("ON") or is not obstructed ("OFF")
		TILT			view whether the tilt sensor is obstructed ("ON") or is not obstructed ("OFF")
		PAN			view whether the pan sensor is obstructed ("ON") or is not obstructed ("OFF")
	F/RS				reset fixture hours to zero *(press and hold the <Enter> button for 5 seconds to change the value)*
	L/RS				reset lamp hours to zero (press *and hold the <Enter> button for 5 seconds to change the value)*
	UNUM				*Customer Service use only*
PRST	PLAY	OFF			set preset playback off
		ON			set preset playback on
		SCN			display which scene is currently playing
	EDIT	SN01 - SN16	SHUT	CLSD	close shutter
				P01 - P28	periodic shutter strobe at specified intervals, slow (P 01) to fast (P 28)
				NN01 - NN28	shutter strobe at random intervals, slow (N 01) to fast (N 28)
				NK01 - NK28	random shutter strobe, slow (NK01) to fast (NK28), in synchronization with the random strobing of all other Studio Spot 250/Studio Color 250 fixtures on the link
				RS01 - RS28	shutter ramp open, slow (RS01) to fast (RS28), snap shut
				SR01 - SR28	shutter snap open, ramp shut slow (SR01) to fast (SR28)
				RR01 - RR28	shutter ramp open, ramp shut slow (RR01) to fast (RR28)
				NR01 - NR28	random ramp open, slow (NR01) to fast (NR28), snap shut
				NS01 - NS28	random snap open, ramp shut slow (NS01) to fast (NS28)
				OPEN	shutter open

Table 4-2. Studio Color® 250 Menu Map

Menu Level 1	Menu Level 2	Menu Level 3	Menu Level 4	Menu Level 5	Description
PRST	EDIT	SN01-SN16	DIM	D001 - D255	select a dim value from dark (D001) to bright (D255)
			PAN	-49.9 - +49.9	select a pan value from -49.9% to +49.9% of the pan range
			TILT	-49.9 - +49.9	select a tilt value from -49.9% to +49.9% of the tilt range
			COLC	CON	select exact positioning at any point on the color wheel, full speed
				IDX	divide the cyan, magenta, and yellow color wheels into eight equal sections, full speed
				MIX	access only the portion of the wheel used for color mixing, full speed
				WSP	set all three color wheels to spin mode, full speed
				CYC	use only the color mixing portion (for all three color wheels) to cycle colors from red to green to blue (rate set by cyan DMX channel), full speed
				TBD	*To be determined - Reserved for future use*
				RND	perform color chase of 12 factory-selected colors using the three color wheels (rate set by cyan DMX channel), full speed
				BLK	shutter blink between indexed color changes, full speed
				MCON	select exact positioning at any point on the color wheel, MSpeed
				MIDX	divide the cyan, magenta, and yellow color wheels into eight equal sections, MSpeed
				MMIX	access only the portion of the wheel used for color mixing, MSpeed
				MWSP	set all three color wheels to spin mode, MSpeed
				MCYC	use only the color mixing portions (for all three color wheels) to cycle colors from red to green to blue (rate set by cyan DMX channel), MSpeed
				MTBD	*To be determined - Reserved for future use*
				MRND	perform color chase of 12 factory-selected colors using the three color wheels (rate set by cyan DMX channel), MSpeed
				MBLK	shutter blink between indexed color changes, MSpeed
			CYAN	D000 - D358	select an exact position on the cyan color wheel from 0° (D000) to 358° (D358) - only available with COLC value of CON or MCON
				OPEN	select the open "white" position on the cyan color wheel - only available with COLC value of IDX or MIDX

Table 4-2. Studio Color® 250 Menu Map

Menu Level 1	Menu Level 2	Menu Level 3	Menu Level 4	Menu Level 5	Description
PRST	EDIT	SN01 - SN16	CYAN	C 1	select the first fixed color (dark blue) on the cyan color wheel - only available with COLC value of IDX or MIDX
				C 2	select the second fixed color (UV black) on the cyan color wheel - only available with COLC value of IDX or MIDX
				S 5	choose the most saturated position on the cyan color wheel - only available with COLC value of IDX or MIDX
				S 4	choose the second saturated position on the cyan color wheel - only available with COLC value of IDX or MIDX
				S 3	choose the third saturated position on the cyan color wheel - only available with COLC value of IDX or MIDX
				S 2	choose the fourth saturated position on the cyan color wheel - only available with COLC value of IDX or MIDX
				S 1	choose the least saturated position on the cyan color wheel - only available with COLC value of IDX or MIDX
				C000 - C255	select an exact position within the color mixing section of the cyan color wheel from most saturated (C000) to least saturated (C255) - only available with COLC value of MIX or MMIX
				D000 - D358	select an exact position on the cyan color wheel from 0° (D000) to 358° (D358) while the other color wheels are spinning - only available with COLC value of WSP or MWSP
				WR60 - WR01	select a reverse cyan color wheel spin speed from fast (WR60) to slow (WR01) - only available with COLC value of WSP or MWSP
				STIL	stop the cyan color wheel from spinning - only available with COLC value of WSP or MWSP
				WF01 - WF60	select a forward cyan color wheel spin speed from slow (WR01) to fast (WR60) - only available with COLC value of WSP or MWSP
				L000 - L255	select the speed at which all three color wheels move to the next cycle color, from slow (L000) to fast (L255) - only available with COLC value of CYC or MCYC
				N000 - N255	select the speed at which all three color wheels move to the next random color, from slow (N000) to fast (N255)

Table 4-2. Studio Color® 250 Menu Map

Menu Level 1	Menu Level 2	Menu Level 3	Menu Level 4	Menu Level 5	Description
			CYAN	BC 1	choose the first fixed color (dark blue) on the cyan color wheel with shutter blink - only available with COLC value of BLK or MBLK
				BC 2	choose the second fixed color (UV black) on the cyan color wheel with shutter blink - only available with COLC value of BLK or MBLK
				BS 5	choose the most saturated position on the cyan color wheel with shutter blink - only available with COLC value of BLK or MBLK
				BS 4	choose the second saturated position on the cyan color wheel with shutter blink - only available with COLC value of BLK or MBLK
				BS 3	choose the third saturated position on the cyan color wheel with shutter blink - only available with COLC value of BLK or MBLK
				BS 2	choose the fourth saturated position on the cyan color wheel with shutter blink - only available with COLC value of BLK or MBLK
				BS 1	choose the least saturated position on the cyan color wheel with shutter blink - only available with COLC value of BLK or MBLK
PRST	EDIT	SN01 - SN16	MAGN	D000 - D358	select an exact position on the magenta color wheel from 0° (D000) to 358° (D358) - only available with COLC value of CON or MCON
				OPEN	select the open "white" position on the magenta color wheel - only available with COLC value of IDX or MIDX
				M 1	choose the first fixed color (aqua) on the magenta color wheel - only available with COLC value of IDX or MIDX
				M 2	choose the second fixed color (red) on the magenta color wheel - only available with COLC value of IDX or MIDX
				S 5	choose the most saturated position on the magenta color wheel - only available with COLC value of IDX or MIDX
				S 4	choose the second saturated position on the magenta color wheel - only available with COLC value of IDX or MIDX
				S 3	choose the third saturated position on the magenta color wheel - only available with COLC value of IDX or MIDX
				S 2	choose the fourth saturated position on the magenta color wheel - only available with COLC value of IDX or MIDX

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Table 4-2. Studio Color® 250 Menu Map

Menu Level 1	Menu Level 2	Menu Level 3	Menu Level 4	Menu Level 5	Description
PRST	EDIT	SN01 - SN16	MAGN	S 1	choose the least saturated position on the magenta color wheel - only available with COLC value of IDX or MIDX
				M000 - M255	select an exact position within the color mixing section of the magenta color wheel from most saturated (M000) to least saturated (M255) - only available with COLC value of MIX or MMIX
				D000 - D358	select an exact position on the magenta color wheel from 0° (D000) to 358° (D358) while the other color wheels are spinning - only available with COLC value of WSP or MWSP
				WR60 - WR01	select a reverse magenta color wheel spin speed from fast (WR60) to slow (WR01) - only available with COLC value of WSP or MWSP
				STIL	stop the magenta color wheel from spinning - only available with COLC value of WSP or MWSP
				WF01 - WF60	select a forward magenta color wheel spin speed from slow (WR01) to fast (WR60) - only available with COLC value of WSP or MWSP
				BM 1	choose the first fixed color (aqua) on the magenta color wheel with shutter blink - only available with COLC value of BLK or MBLK
				BM 2	choose the second fixed color (red) on the magenta color wheel with shutter blink - only available with COLC value of BLK or MBLK
				BS 5	choose the most saturated position on the magenta color wheel with shutter blink - only available with COLC value of BLK or MBLK
				BS 4	choose the second saturated position on the magenta color wheel with shutter blink - only available with COLC value of BLK or MBLK
				BS 3	choose the third saturated position on the magenta color wheel with shutter blink - only available with COLC value of BLK or MBLK
				BS 2	choose the fourth saturated position on the magenta color wheel with shutter blink - only available with COLC value of BLK or MBLK
				BS 1	choose the least saturated position on the magenta color wheel with shutter blink - only available with COLC value of BLK or MBLK
			YELW	D000 - D358	select an exact position on the yellow color wheel from 0° (D000) to 358° (D358) - only available with COLC value of CON or MCON

Table 4-2. Studio Color® 250 Menu Map

Menu Level 1	Menu Level 2	Menu Level 3	Menu Level 4	Menu Level 5	Description
PRST	EDIT	SN01 - SN16	YELW	OPEN	select the open "white" position on the yellow color wheel - only available with COLC value of IDX or MIDX
				Y 1	choose the first fixed color (amber) on the yellow color wheel - only available with COLC value of IDX or MIDX
				Y 2	choose the second fixed color (CTO) on the yellow color wheel - only available with COLC value of IDX or MIDX
				S 5	choose the most saturated position on the yellow color wheel - only available with COLC value of IDX or MIDX
				S 4	choose the second saturated position on the yellow color wheel - only available with COLC value of IDX or MIDX
				S 3	choose the third saturated position on the yellow color wheel - only available with COLC value of IDX or MIDX
				S 2	choose the fourth saturated position on the yellow color wheel - only available with COLC value of IDX or MIDX
				S 1	choose the least saturated position on the magenta color wheel - only available with COLC value of IDX or MIDX
				Y000 - Y255	select an exact position within the color mixing section of the yellow color wheel from most saturated (M000) to least saturated (M255) - only available with COLC value of MIX or MMIX
				D000 - D358	select an exact position on the yellow color wheel from 0° (D000) to 358° (D358) while the other color wheels are spinning - only available with COLC value of WSP or MWSP
				WR60 - WR01	select a reverse yellow color wheel spin speed from fast (WR60) to slow (WR01) - only available with COLC value of WSP or MWSP
				STIL	stop the yellow color wheel from spinning - only available with COLC value of WSP or MWSP
				WF01 - WF60	select a forward yellow color wheel spin speed from slow (WR01) to fast (WR60) - only available with COLC value of WSP or MWSP
				BY 1	choose the first fixed color (amber) on the yellow color wheel with shutter blink - only available with COLC value of BLK or MBLK

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Table 4-2. Studio Color® 250 Menu Map

Menu Level 1	Menu Level 2	Menu Level 3	Menu Level 4	Menu Level 5	Description
			YELW	BY 2	choose the second fixed color (CTO) on the yellow color wheel with shutter blink - only available with COLC value of BLK or MBLK
				BS 5	choose the most saturated position on the yellow color wheel with shutter blink - only available with COLC value of BLK or MBLK
				BS 4	choose the second saturated position on the yellow color wheel with shutter blink - only available with COLC value of BLK or MBLK
				BS 3	choose the third saturated position on the yellow color wheel with shutter blink - only available with COLC value of BLK or MBLK
				BS 2	choose the fourth saturated position on the yellow color wheel with shutter blink - only available with COLC value of BLK or MBLK
				BS 1	choose the least saturated position on the yellow color wheel with shutter blink - only available with COLC value of BLK or MBLK
PRST	EDIT	SN01 - SN16	BEAM	D000 - D358	select an exact position on the lenticular wheel from 0° (D000) to 358° (D358)
				WR60 - WR01	select a reverse lenticular wheel spin speed, from fast (WR60) to slow (WR01)
				STIL	stop the lenticular wheel from spinning
				WF01 - WF60	select a forward lenticular wheel spin speed, from slow (WF01) to fast (WF60)
			FCUS	000 - 255	select a zoom value for the beam angle from 21° (000) to 25° (255)
			MSPD	0.15 - 252.7	select a motor movement time in decimal seconds, from fast (0.15) to slow (252.7)
			MACR	MCOF	set all Macro/LAD options off
				MC01 - MC32	select a factory-programmed macro
				RN01 - RN32	select all 32 factory-programmed macros to play in random order at variable speeds from slow (RN01) to fast (RN32)
				LROF	set LAD off
				LM01 - LM32	modulate LAD from slow (LM01) to fast (LM32)
				LRON	set LAD continuously on
			XFAD	X 0.1 - X 9.9	select the DIM and FCUS construct's crossfade time in increments of 0.1
				X 10 - X166	select the DIM and FCUS construct's crossfade time in increments of 1

Table 4-2. Studio Color® 250 Menu Map

Menu Level 1	Menu Level 2	Menu Level 3	Menu Level 4	Menu Level 5	Description
PRST	EDIT	SN01 - SN16	DLAY	D 0.1 - D 9.9	select the scene delay time in increments of 0.1
				D 10 - D166	select the scene delay time in increments of 1
			TIME	SEC	select seconds as the units of time used for the XFAD and DLAY constructs
				MIN	select minutes as the units of time used for the XFAD and DLAY constructs
				HOUR	select hours as the units of time used for the XFAD and DLAY constructs
			ZERO	OK?	erase any programming of the current scene by voiding all construct values / mark the end of the loop
	COPY	FROM	FA01 - FA16		select a user A scene to copy from (source scene)
			FB01 - FB16		select a user B scene to copy from (source scene)
		TO	TA01 - TA16		select a user A scene to copy to (destination scene)
			TB01 - TB16		select a user B scene to copy to (destination scene)
	CAPT	SN01 - SN16			select a scene to capture a pre-programmed scene to (from your DMX controller)
	DFLT	OK?			enable the factory-programmed preset scene sequence - erases any preset scenes previously programmed

4

Fixture Options

The sections below explain how to access the fixture options shown in the fixture's menu map. All menu items are explained except preset programming (PRST), which is discussed in "Chapter 5 Preset Programming" on page 5-1.

Address Menu (ADDR)

Use the Address menu to quickly change the current fixture number/DMX start channel. Using this menu option, you can only change the *existing* fixture number to another fixture number, or the *existing* DMX start channel to another DMX start channel.

If you want to change the way you identify the fixture (i.e. change to a fixture number instead of a DMX start channel, or vice versa), complete the procedure described in "Changing the Control Method (CHNL)" on page 4-24.

To change the current fixture number or DMX start channel:

`AddR` 1. Press and hold the <Menu> button until "ADDR" appears on the LED display.

2. Press the <Enter> button to select the "ADDR" menu.
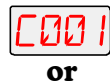
`C001`
or
`F 01`

3. Use the <Up> and <Down> arrow buttons to select a new DMX start channel (C001 - C512) / fixture number (F 01 - F xx). The LED display will flash when a new option is selected.

4. Press the <Enter> button to accept the new fixture number / DMX start channel. The LED display will stop flashing when a new option is entered. If you do not press the <Enter> button, the new option you selected will not be stored.

Note: Be sure you do not overlap fixture channel ranges when changing the fixture number/DMX start channel (see "Channel Range" on page 2-3).

Set Menu (SET)

The Set menu allows you to change the fixture number to a DMX start channel or vice versa, and either set all factory options to their default settings or change the factory options individually. The procedures below are listed in the order they appear on the menu map (see Table 4-1 or Table 4-2).

Setting Factory Defaults (FACT)

When you set this menu item on, all factory options return to their default settings. Studio Spot 250 and Studio Color 250 fixtures are shipped from the factory with the following options set to the following defaults:

- pan/tilt swap = off
- tilt invert = off
- pan invert = off
- LED display = on and bright
- LED display invert = off
- lamp life warning = disabled
- preset playback = off

To change the factory option default setting:

1. Press and hold the <Menu> button until "ADDR" appears on the LED display.

2. Using the <Up> and <Down> arrow buttons, scroll to the "SET" menu and press the <Enter> button to select the "SET" menu.

3. Using the <Up> and <Down> arrow buttons, scroll to the "FACT" menu. (This will be the first menu displayed.) Press the <Enter> button to select the "FACT" menu.

4. Using the <Up> and <Down> arrow buttons, choose "ON" to set the factory option defaults on, or "OFF" to manually set the factory option defaults off. Press the <Enter> button to select the desired option.

Note: Selecting the "OFF" option will have no effect on the individual preset values. To change the value of any of the individual presets listed above, you must access each preset's corresponding menu item. When you change any of the preset default values individually, this menu item will *automatically* be turned off.

Swapping Pan and Tilt (SWAP)

This menu option swaps the pan motor and tilt motor operation. This option allows a perpendicularly-hung fixture to respond to pan and tilt movement commands in the same direction as a fixture hung normally (see Figure 4-2).

To swap pan and tilt motion:

Figure 4-2. Perpendicularly-hung fixture.

| AddR | 1. | Press and hold the <Menu> button until "ADDR" appears on the LED display. |

| SET | 2. | Using the <Up> and <Down> arrow buttons, scroll to the "SET" menu and press the <Enter> button to select the "SET" menu. |

| SWAP | 3. | Using the <Up> and <Down> arrow buttons, scroll to the "SWAP" menu and press the <Enter> button to select the "SWAP" menu. |

| ON **or** OFF | 4. | Using the <Up> and <Down> arrow buttons, choose the "ON" option to swap the fixture's pan and tilt motion, or the "OFF" option to return the fixture's pan and tilt motion to normal orientation. Press the <Enter> button to select the desired option. |

Inverting Tilt (T/IN)

This menu item inverts the direction of the tilt motor, which allows a fixture standing upright (i.e., resting on its bottom panel) to respond to tilt movement commands in the same direction as a fixture hung normally (see Figure 4-3).

To invert the fixture's tilt motion:

| AddR | 1. | Press and hold the <Menu> button until "ADDR" appears on the LED display. |

| SET | 2. | Using the <Up> and <Down> arrow buttons, scroll to the "SET" menu and press the <Enter> button to select the "SET" menu. |

Figure 4-3. Inverted fixture.

| T/IN | 3. | Using the <Up> and <Down> arrow buttons, scroll to the "T/IN" menu and press the <Enter> button to select the "T/IN" menu. |

| ON **or** OFF | 4. | Using the <Up> and <Down> arrow buttons, choose the "ON" option to invert the fixture's tilt motion, or the "OFF" option to return the fixture's tilt motion to normal orientation. Press the <Enter> button to select the desired option. |

Inverting Pan (P/IN)

This menu item inverts the direction of the pan motor, which allows opposing fixtures to respond to pan movement commands in the same direction (see Figure 4-4).
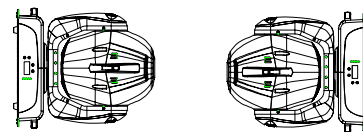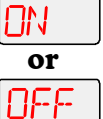
Figure 4-4. Opposing fixtures.

To invert the fixture's pan motion:
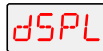
| AddR | 1. | Press and hold the <Menu> button until "ADDR" appears on the LED display. |

| SET | 2. | Using the <Up> and <Down> arrow buttons, scroll to the "SET" menu and press the <Enter> button to select the "SET" menu. |

| P/IN | 3. | Using the <Up> and <Down> arrow buttons, scroll to the "P/IN" menu and press the <Enter> button to select the "P/IN" menu. |

| ON
or
OFF | 4. | Using the <Up> and <Down> arrow buttons, choose the "ON" option to invert the fixture's pan motion, or the "OFF" option to return the fixture's pan motion to normal orientation. Press the <Enter> button to select the desired option. |

Changing the Display Output (DSPL)

This menu item allows you to change the appearance of the fixture's alphanumeric LED display. You can set the display on or off, or you can dim the display to reduce visibility.

To change the display output:

| AddR | 1. | Press and hold the <Menu> button until "ADDR" appears on the LED display. |

| SET | 2. | Using the <Up> and <Down> arrow buttons, scroll to the "SET" menu and press the <Enter> button to select the "SET" menu. |

| dSPL | 3. | Using the <Up> and <Down> arrow buttons, scroll to the "DSPL" menu and press the <Enter> button to select the "DSPL" menu. |

| ON
or
OFF
or
dIM | 4. | Using the <Up> and <Down> arrow buttons, choose the "ON" option to set the LED display to normal intensity, the "OFF" option to turn the LED display off, or the "DIM" option to reduce the LED display visibility. Press the <Enter> button to select the desired option. |

Inverting LED Characters (D/IN)

This menu item allows you to invert the orientation of the LED display's alphanumeric characters. This option is useful if your fixture is standing upright (i.e., resting on its bottom panel on the floor).

To invert the LED display:

`AddR`   1. Press and hold the <Menu> button until "ADDR" appears on the LED display.

`SET`   2. Using the <Up> and <Down> arrow buttons, scroll to the "SET" menu and press the <Enter> button to select the "SET" menu.

`d/IN`   3. Using the <Up> and <Down> arrow buttons, scroll to the "D/IN" menu and press the <Enter> button to select the "D/IN" menu.

`ON`
or
`OFF`   4. Using the <Up> and <Down> arrow buttons, choose the "ON" option to invert the fixture's alphanumeric characters, or the "OFF" option to return the fixture's alphanumeric characters to normal orientation. Press the <Enter> button to select the desired option.

Changing the Control Method (CHNL)

Use this menu item if your fixture is currently set to a fixture number and instead, you want to identify the fixture using a DMX start channel, or vice versa. To simply change an existing fixture number to a different fixture number (or DMX start channel to a different DMX start channel), see "Address Menu (ADDR)" on page 4-20.

To set a fixture number or DMX start channel:

`AddR`   1. Press and hold the <Menu> button until "ADDR" appears on the LED display.

`SET`   2. Using the <Up> and <Down> arrow buttons, scroll to the "SET" menu and press the <Enter> button to select the "SET" menu.

`CHNL`   3. Using the <Up> and <Down> arrow buttons, scroll to the "CHNL" menu and press the <Enter> button to select the "CHNL" menu.

`dMX`
or
`AddR`   4. Using the <Up> and <Down> arrow buttons, choose either the "DMX" option to address the fixture using a DMX start channel (C001 - C512), or the "ADDR" option to address the fixture using a fixture number (F 01 - F xx). Press the <Enter> button to select the desired option.

    Note: After changing the control method, you must assign a specific DMX start channel or fixture number to each fixture (see "Address Menu (ADDR)" on page 4-20).

Setting the Lamp Warning Message (LMPL)

Use this menu item to enable your fixture to display the warning message "LAMP LIFE ERR" when the current lamp hours exceed 2,000. With this option enabled, after the current lamp hours exceed 2,200 hours, the fixture will display the warning message "LAMP OUT ERR." Once the lamp is extinguished, the fixture will no longer strike the lamp until the current lamp is replaced and the current lamp hours are reset to zero (see "Replacing the Lamp" on page 7-4 or "Resetting Lamp Hours (L/RS)" on page 4-39).

To enable the lamp warning message:

AddR	1. Press and hold the <Menu> button until "ADDR" appears on the LED display.
SET	2. Using the <Up> and <Down> arrow buttons, scroll to the "SET" menu and press the <Enter> button to select the "SET" menu.
LMPL	3. Using the <Up> and <Down> arrow buttons, scroll to the "LMPL" menu and press the <Enter> button to select the "LMPL" menu.
ON or OFF	4. Using the <Up> and <Down> arrow buttons, choose the "ON" option to enable the lamp warning message, or the "OFF" option to disable the lamp warning message. Press the <Enter> button to select the desired option.

Mode Menu (MODE)

The Mode menu allows you to set the fixture type to either Studio Spot 250 or Studio Color 250, choose user A or user B settings, copy settings and presets to user A or user B, and crossload software versions from one fixture to all other Studio Spot 250 or Studio Color 250 fixtures on the link. The procedures below are listed in the order they appear on the menu map (see Table 4-1 or Table 4-2).

Setting the Fixture Type (TYPE)

Use this menu item to change the fixture type to either Studio Spot 250 or Studio Color 250. All fixtures are shipped from the factory set to the correct fixture type. However, if the fixture's logic board is replaced, you must ensure the new board is set to the correct fixture type.

To set the fixture type:

AddR	1. Press and hold the <Menu> button until "ADDR" appears on the LED display.

`MOdE` 2. Using the <Up> and <Down> arrow buttons, scroll to the "MODE" menu and press the <Enter> button to select the "MODE" menu.

`TYPE` 3. Using the <Up> and <Down> arrow buttons, scroll to the "TYPE" menu. (This will be the first menu displayed). Press the <Enter> button to select the "TYPE" menu.

`SPOT`
or
`COLR`

4. Using the <Up> and <Down> arrow buttons, choose the "SPOT" option for Studio Spot 250 fixtures, or the "COLR" option for Studio Color 250 fixtures.   Press the <Enter> button to select the desired option.

Setting the User Type (USER)

Use this menu item to change the fixture's user type from user A to user B or vice versa. Each user type includes 16 different presets (scenes) and the following fixture settings:

- Fixture Address
- Pan Invert
- Tilt Invert
- Pan/Tilt Swap
- Control Method (addressing via fixture number or DMX start channel)
- Display Settings (On, Off, or Dim)
- Display Character Invert
- Lamp Warning Message

Changing the user type allows you to access 16 different scenes, and allows you to access a set of "default" fixture settings. For example, if your fixture's settings (listed above) are designed for a specific location in your truss and you need to move the fixture to a new location, you could change the user type to user "B" for the settings needed at the new location, and change the user type back to user "A" when you move the fixture back to its original location.

To change the user type:

`AddR` 1. Press and hold the <Menu> button until "ADDR" appears on the LED display.

`MOdE` 2. Using the <Up> and <Down> arrow buttons, scroll to the "MODE" menu and press the <Enter> button to select the "MODE" menu.

`USER` 3. Using the <Up> and <Down> arrow buttons, scroll to the "USER" menu and press the <Enter> button to select the "USER" menu.

`A`
or
`b`
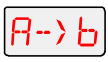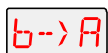
4. Using the <Up> and <Down> arrow buttons, choose the "A" option to select user A settings, or the "B" option to select user B settings.   Press the <Enter> button to select the desired option.
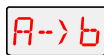
Copying User Presets (PRST)

Use this menu item to copy the fixture's user presets from user A to user B or vice versa. Each user type includes 16 different presets (scenes) which can be copied to a different user type.

> Note: This options copies *all* 16 presets at one time.

To copy user presets:

`AddR` 1. Press and hold the <Menu> button until "ADDR" appears on the LED display.

`MOdE` 2. Using the <Up> and <Down> arrow buttons, scroll to the "MODE" menu and press the <Enter> button to select the "MODE" menu.

`USER` 3. Using the <Up> and <Down> arrow buttons, scroll to the "USER" menu and press the <Enter> button to select the "USER" menu.
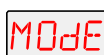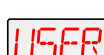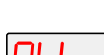
`COPY` 4. Using the <Up> and <Down> arrow buttons, scroll to the "COPY" menu and press the <Enter> button to select the "COPY" menu.

`PRST` 5. Using the <Up> and <Down> arrow buttons, scroll to the "PRST" menu. (This will be the first menu displayed.) Press the <Enter> button to select the "PRST" menu.

`A->b`
or
`b->A` 6. Using the <Up> and <Down> arrow buttons, choose the "A $\rightarrow$ B" option to copy user A presets to user B, or the "B $\rightarrow$ A" option to copy user B presets to user A. Press the <Enter> button to select the desired option.

Copying User Settings (SETT)

Use this menu item to copy the fixture's user settings from user A to user B or vice versa. The user settings for each user type are listed in the section titled "Setting the User Type (USER)" on page 4-26.

> Note: This options copies *all* user settings at one time.

To copy user settings:

`AddR` 1. Press and hold the <Menu> button until "ADDR" appears on the LED display.

`MOdE` 2. Using the <Up> and <Down> arrow buttons, scroll to the "MODE" menu and press the <Enter> button to select the "MODE" menu.

`USER` 3. Using the <Up> and <Down> arrow buttons, scroll to the "USER" menu and press the <Enter> button to select the "USER" menu.
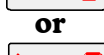
`COPY`   4. Using the <Up> and <Down> arrow buttons, scroll to the "COPY" menu and press the <Enter> button to select the "COPY" menu.

`SETT`   5. Using the <Up> and <Down> arrow buttons, scroll to the "SETT" menu and press the <Enter> button to select the "SETT" menu.

`A->b`
or
`b->A`   6. Using the <Up> and <Down> arrow buttons, choose the "A → B" option to copy user A settings to user B, or the "B → A" option to copy user B settings to user A. Press the <Enter> button to select the desired option.

Copying User Presets and Settings (ALL)

Use this menu item to copy the fixture's 16 user presets and fixture settings from user A to user B or vice versa. The user settings for each user type are listed in the section titled "Setting the User Type (USER)" on page 4-26.

Note: This options copies *all* user settings and *all* 16 presets at one time.
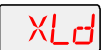
To copy user presets and settings:

`AddR`   1. Press and hold the <Menu> button until "ADDR" appears on the LED display.

`MOdE`   2. Using the <Up> and <Down> arrow buttons, scroll to the "MODE" menu and press the <Enter> button to select the "MODE" menu.

`USER`   3. Using the <Up> and <Down> arrow buttons, scroll to the "USER" menu and press the <Enter> button to select the "USER" menu.

`COPY`   4. Using the <Up> and <Down> arrow buttons, scroll to the "COPY" menu and press the <Enter> button to select the "COPY" menu.

`ALL`   5. Using the <Up> and <Down> arrow buttons, scroll to the "ALL" menu and press the <Enter> button to select the "ALL" menu.

`A->b`
or
`b->A`   6. Using the <Up> and <Down> arrow buttons, choose the "A → B" option to copy all user A presets and settings to user B, or the "B → A" option to copy all user B presets and settings to user A. Press the <Enter> button to select the desired option.

Crossloading Fixture Software (XLD)

Studio Spot 250 and Studio Color 250 fixtures use the same software. Therefore, if you have a fixture with a newer software version, you can crossload the newer software to all other Studio Spot 250 and Studio Color 250 fixtures on the link.

To crossload software from one fixture to all other Studio Spot 250 and Studio Color 250 fixtures on the link:

1. Disconnect or bypass any controllers, serial data distributors, data line optoisolators, and any fixtures using RS-422 communications (such as Dataflash® AF1000 xenon strobes, Intellabeam® fixtures, and Emulator® laser simulators). These devices will block communication between your crossloading fixture and any other Studio Spot 250 or Studio Color 250 fixtures on the link.

`AddR`   2. On the crossloading fixture *only*, press and hold the <Menu> button until "ADDR" appears on the LED display.

`MOdE`   3. Using the <Up> and <Down> arrow buttons, scroll to the "MODE" menu and press the <Enter> button to select the "MODE" menu.

`XLd`   4. Using the <Up> and <Down> arrow buttons, scroll to the "XLD" option and press the <Enter> button to select the "XLD" option. The fixture will upload its software to all other Studio Spot 250 and Studio Color 250 fixtures on the link.

The Transmit LED on the crossloading fixture will remain on (or flicker) and the Transmit and Receive LEDs on receiving fixtures will flicker while the crossload is in progress. The LED display on the Studio Spot 250 and Studio Color 250 fixtures will display "UPLD" as they are receiving the software upload. When the crossload has finished successfully, "DONE" will appear briefly in the LED display of the crossloading fixture, and all other fixtures will home.

Note: If a new boot code was included with the latest software, the LED will display a "BOOT DIFF" error. To correct the boot code, you must copy the new boot code for each fixture (see "Copying the Boot Code (BOOT)" on page 4-31).

Test Menu (TEST)

The Test menu allows you to manually home the fixture, turn the lamp on or off, perform fixture self tests, and store new boot code information. If you are experiencing problems that you suspect are mechanical, performing fixture self tests will help to determine where the problem lies. The procedures below are listed in the order they appear on the menu map (see Table 4-1 or Table 4-2).

Note: To see the effects of the self tests, the lamp must be on. If the lamp is off when you run the self test, the LED will display "STRK" to indicate that the lamp is not struck, and the fixture will attempt to strike the lamp automatically.

Homing the Fixture (HOME)

This menu item allows you to manually home the fixture. If you want to remotely home the fixture (using a DMX controller), see "Control" on page 3-14.

⚠ **Caution: You should home the fixture *immediately* if you notice that the litho wheel has lost position (i.e. stuck between two litho patterns). If the litho wheel is not correctly aligned in the optical path, the wheel could be damaged.**

To manually home the fixture:

AddR   1.   Press and hold the <Menu> button until "ADDR" appears on the LED display.

TEST   2.   Using the <Up> and <Down> arrow buttons, scroll to the "TEST" menu and press the <Enter> button to select the "TEST" menu.

HOME   3.   Using the <Up> and <Down> arrow buttons, scroll to the "HOME" option. (This will be the first option displayed.)

    4.   Press the <Enter> button to select the "HOME" option. The LED will alternately display "RST" and "HOME" while the fixture homes.

Turning the Lamp On or Off (LAMP)

To manually turn the lamp on or off:

AddR   1.   Press and hold the <Menu> button until "ADDR" appears on the LED display.

TEST   2.   Using the <Up> and <Down> arrow buttons, scroll to the "TEST" menu and press the <Enter> button to select the "TEST" menu.

LAMP   3.   Using the <Up> and <Down> arrow buttons, scroll to the "LAMP" menu and press the <Enter> button to select the "LAMP" menu.

ON
or
OFF   4.   Using the <Up> and <Down> arrow buttons, choose the "ON" option to strike the lamp, or the "OFF" option to extinguish the lamp. Press the <Enter> button to select the desired option.

Copying the Boot Code (BOOT)

When you upload new software to Studio Spot 250 and Studio Color 250 fixtures, the new software may contain a new boot code which must be copied to each fixture. This is apparent if the LED displays a "BOOT DIFF" error. *Do not remove power from the fixture while performing a boot copy.*

To accept and store the new boot code:

`AddR` 1. Press and hold the <Menu> button until "ADDR" appears on the LED display.

`TEST` 2. Using the <Up> and <Down> arrow buttons, scroll to the "TEST" menu and press the <Enter> button to select the "TEST" menu.

`bOOT` 3. Using the <Up> and <Down> arrow buttons, scroll to the "BOOT" option and press the <Enter> button to select the "BOOT" option. The fixture will store the new boot code, then automatically home.

Performing Self Tests (SELF)

This menu item performs the appropriate self tests for the following:

- ALL - performs all of the self tests listed below
- PAN - moves the pan motor from 0° to 570°
- TILT - moves the tilt motor from 0° to 270°
- COL - rotates the color wheel from position 1 through 13*****
- LTO - rotates the litho wheel from position 1 through 8 and from 0° to 359° within the wheel*****
- CYAN - divides the cyan color wheel into eight equal sections (positions) and rotates the cyan color wheel from position 1 through 8******
- MAGN - divides the magenta color wheel into eight equal sections (positions) and rotates the magenta color wheel from position 1 through 8******
- YELW - divides the yellow color wheel into eight equal sections (positions) and rotates the yellow color wheel from position 1 through 8******
- FX - rotates the litho wheel from position 1 through 5 and from 0° to 359° within the wheel*****
- BEAM - moves the beam shaping (lenticular wheel) from 0° to 359°******
- FCUS - moves the Studio Spot 250 lens through the entire focus range or the Studio Color 250 zoom through the entire beam angle range
- IRIS - moves the iris from closed to fully open*****
- SHUT - performs strobe functions
- DIM - moves the dim flag from closed to fully open

**menu items only available for Studio Spot 250 fixtures*
***menu items only available for Studio Color 250 fixtures*

To perform a self test:

`AddR`   1. Press and hold the <Menu> button until "ADDR" appears on the LED display.

`TEST`   2. Using the <Up> and <Down> arrow buttons, scroll to the "TEST" menu and press the <Enter> button to select the "TEST" menu.

`SELF`   3. Using the <Up> and <Down> arrow buttons, scroll to the "SELF" menu and press the <Enter> button to select the "SELF" menu.

   4. Using the <Up> and <Down> arrow buttons, scroll to the desired option (listed above). Press the <Enter> button to select the desired option. The fixture will perform the selected self test.

   5. Press the <Menu> button to exit the test.

Note: The self tests will run continuously until you press the <Menu> button to exit the test.

Placing the Fixture in Setup Mode (S/UP)

This menu item allows you to place the fixture in setup mode so that you can mechanically home your fixture. A fixture that is out of home (i.e., the dim flags or iris loses position), will emit an unusually loud clicking noise when strobing or electronically homing. For more information on how to mechanically home the fixture, contact High End Systems customer service (see "Contacting High End Systems" on page ii).

To place the fixture in setup mode:

`AddR`   1. Press and hold the <Menu> button until "ADDR" appears on the LED display.

`TEST`   2. Using the <Up> and <Down> arrow buttons, scroll to the "TEST" menu and press the <Enter> button to select the "TEST" menu.

`S/UP`   3. Using the <Up> and <Down> arrow buttons, scroll to the "S/UP" option and press the <Enter> button to select the "S/UP" option.

   4. When the LED displays "SET NOW," mechanically home the fixture.

   5. After mechanically homing the fixture, press any button. This causes the fixture to electronically home.

Testing the LED Display (DISP)

To perform a self-test on the LED display:

`AddR` 1. Press and hold the <Menu> button until "ADDR" appears on the LED display.

`TEST` 2. Using the <Up> and <Down> arrow buttons, scroll to the "TEST" menu and press the <Enter> button to select the "TEST" menu.

`dISP` 3. Using the <Up> and <Down> arrow buttons, scroll to the "DISP" option and press the <Enter> button to select the "DISP" option. The LED will run through its self test.

4. Press the <Menu> button to exit the test.

Note: The self test will run continuously until you press the <Menu> button to exit the test.

Information Menu (INFO)

4

The Information menu allows you to view current fixture information such as internal temperature, lamp hours, total fixture hours, lamp strikes, software version, total fixture hours, DMX errors, and view DMX data for any device on the link. You can also reset the lamp hours or fixture hours. The procedures below are listed in the order they appear on the menu map (see Table 4-1 or Table 4-2).

Viewing the Current Logic Board Temperature (PCB)

This menu option allows you to view the current ambient temperature at the logic board inside the fixture.

To view the logic board temperature:

`AddR` 1. Press and hold the <Menu> button until "ADDR" appears on the LED display.

`INFO` 2. Using the <Up> and <Down> arrow buttons, scroll to the "INFO" menu and press the <Enter> button to select the "INFO" menu.

`PCb` 3. Using the <Up> and <Down> arrow buttons, scroll to the "PCB" option. (This will be the first option displayed.) Press the <Enter> button to select the "PCB" option. The LED will display the current internal temperature of the fixture's logic board in degrees centigrade.

The maximum temperature for the logic board is 85 C. If this maximum temperature is exceeded, the fixture will shut down and the LED panel will display "PCB TEMP ERR." For more information on LED display error messages, see "LED Display Error Messages" on page 8-1.

Viewing the Current Fixture Head Temperature (HEAD)

This menu option allows you to view the current ambient temperature inside the fixture's head.

To view the fixture's head temperature:

`AddR`   1. Press and hold the <Menu> button until "ADDR" appears on the LED display.

`INFO`   2. Using the <Up> and <Down> arrow buttons, scroll to the "INFO" menu and press the <Enter> button to select the "INFO" menu.

`HEAd`   3. Using the <Up> and <Down> arrow buttons, scroll to the "HEAD" option and press the <Enter> button to select the "HEAD" option. The LED will display the current internal temperature of the fixture's head in degrees centigrade.

The maximum temperature for the fixture head is 100 C. If this maximum temperature is exceeded, the fixture will shut down and the LED panel will display "HEAD TEMP ERR." For more information on LED display error messages, see "LED Display Error Messages" on page 8-1.

Viewing the Current Lamp Hours (L/HR)

To view the number of hours the current lamp has been on:

`AddR`   1. Press and hold the <Menu> button until "ADDR" appears on the LED display.

`INFO`   2. Using the <Up> and <Down> arrow buttons, scroll to the "INFO" menu and press the <Enter> button to select the "INFO" menu.

`L/HR`   3. Using the <Up> and <Down> arrow buttons, scroll to the "L/HR" option and press the <Enter> button to select the "L/HR" option. The LED will display the number of hours the current lamp has been on.

Viewing the Current Fixture Hours (F/HR)

To view the number of hours the fixture has been on since this option was reset:

`AddR`   1. Press and hold the <Menu> button until "ADDR" appears on the LED display.

`INFO`   2. Using the <Up> and <Down> arrow buttons, scroll to the "INFO" menu and press the <Enter> button to select the "INFO" menu.

`F/HR`   3. Using the <Up> and <Down> arrow buttons, scroll to the "F/HR" option and press the <Enter> button to select the "F/HR" option. The LED will display the number of hours the fixture has been on.

Viewing the Number of Current Lamp Strikes (L/ST)

To view the number of times the fixture has struck (or attempted to turn on) the current lamp:

`AddR`	1. Press and hold the <Menu> button until "ADDR" appears on the LED display.
`INFO`	2. Using the <Up> and <Down> arrow buttons, scroll to the "INFO" menu and press the <Enter> button to select the "INFO" menu.
`L/ST`	3. Using the <Up> and <Down> arrow buttons, scroll to the "L/ST" option and press the <Enter> button to select the "L/ST" option. The LED will display the number of times the fixture has struck the current lamp.

Note: Lamp strikes are automatically reset when the lamp hours are reset (see "Resetting Lamp Hours (L/RS)" on page 4-39).

Viewing the Current Software Version (VER)

To view the current software version:

`AddR`	1. Press and hold the <Menu> button until "ADDR" appears on the LED display.
`INFO`	2. Using the <Up> and <Down> arrow buttons, scroll to the "INFO" menu and press the <Enter> button to select the "INFO" menu.
`VER`	3. Using the <Up> and <Down> arrow buttons, scroll to the "VER" option and press the <Enter> button to select the "VER" option. The LED will display the fixture's current software version.

Note: The software version is also displayed when you exit the menu system (see "Identifying Display Panel Components" on page 1-7).

Viewing DMX Status and Construct Values (FIXT)

This menu option allows you to view DMX status and construct values for the fixture. You should follow this procedure if you are having a particular problem with a fixture; for example, a color wheel that does not respond to commands from the controller.

The following DMX status information is available for viewing:
- FE - framing errors (it is normal for this value to be incrementing rapidly)
- OV - overruns (changing values could indicate data link/connector problems)
- STRT - start code

The following construct values are available for viewing:
- PANH - high 8-bit pan value
- PANL - low 8-bit pan value

- TLTH - high 8-bit tilt value
- TLTL - low 8-bit tilt value
- COLC - color control value
- CYAN - cyan color wheel position**
- MAGN - magenta color wheel position**
- YELW - yellow color wheel position **
- COL - color wheel position*
- LTOC - litho control value*
- LTO - litho wheel position*
- LTR - litho wheel rotation value*
- FX - effects wheel position*
- BEAM - beam shaping (lenticular) wheel position**
- FXR - effects wheel rotation value*
- FCUS - lens focus position (for Studio Spot 250 fixtures) or beam angle/zoom position (for Studio Color 250 fixtures)
- IRIS - iris position value*
- SHUT - shutter strobe value
- DIM - shutter dim flag value
- MSPD - MSpeed time value
- MACR - Macro/LAD value
- CNTL - control channel value

*menu items only available for Studio Spot 250 fixtures
**menu items only available for Studio Color 250 fixtures

To view the DMX status and construct values:

AddR 1. Press and hold the <Menu> button until "ADDR" appears on the LED display.

INFO 2. Using the <Up> and <Down> arrow buttons, scroll to the "INFO" menu and press the <Enter> button to select the "INFO" menu.

dMX 3. Using the <Up> and <Down> arrow buttons, scroll to the "DMX" menu and press the <Enter> button to select the "DMX" menu.

FIXT 4. Using the <Up> and <Down> arrow buttons, scroll to the "FIXT" menu and press the <Enter> button to select the "FIXT" menu.

5. Using the <Up> and <Down> arrow buttons, scroll to the desired DMX status or construct (listed above) and press the <Enter> button to select the desired option. The LED will display the selected DMX status or construct value.

If you are having a particular problem with the fixture, follow the steps above to select a construct and view its value. After noting the value of the construct you selected, use your controller to change that construct's value.

If the value changes on the fixture's LED display, but the fixture still does not respond, contact High End Systems customer service in one of the ways shown in the section titled "Contacting High End Systems" on page ii.

However, if the value does not change on the fixture's LED display, remove the fixture from the DMX link and try to change the construct's value using the fixture's menu system. If the fixture then functions normally, the problem was likely with the DMX link. Otherwise, contact High End Systems customer service.

Viewing DMX Data for Another Device (DATA)

This procedure allows you to use a Studio Spot 250 or Studio Color 250 fixture to view DMX channel values for other devices on the DMX link. You should use this procedure either for testing devices that do not have built-in DMX diagnostics, or for fixtures that are physically inconvenient to monitor directly.

To view DMX data for another device on the DMX link:

AddR
1. Press and hold the <Menu> button until "ADDR" appears on the LED display.

INFO
2. Using the <Up> and <Down> arrow buttons, scroll to the "INFO" menu and press the <Enter> button to select the "INFO" menu.

dMX
3. Using the <Up> and <Down> arrow buttons, scroll to the "DMX" menu and press the <Enter> button to select the "DMX" menu.

dATA
4. Using the <Up> and <Down> arrow buttons, scroll to the "DATA" menu and press the <Enter> button to select the "DATA" menu.

C001
to
C512
5. Using the <Up> and <Down> arrow buttons, scroll to the desired DMX channel (C001 - C512) and press the <Enter> button to select the desired DMX channel. The LED will display the selected channel's DMX value.

If you are experiencing a particular problem with a device on the link, follow the steps above to select a DMX channel in the device's channel range and view its DMX value. After noting the value of the channel you selected, use your controller to change that channel's value.

If the value of the DMX channel you selected does not change, there may be a problem with the DMX cable or your transmitting device (i.e. controller).

However, if the DMX channel value changes, but the device does not respond, the device may be faulty. Consult the documentation provided with that device for more information.

Viewing Sensor Information (SENS)

This menu option allows you to view whether a specified sensor if working correctly. If you receive a "SENS ERR" error message on the LED display, this information may help you determine where the problem originates (see "LED Display Error Messages" on page 8-1).

Sensor information is available for the following:

- LTO - litho wheel*****
- FX - effects wheel*****
- LTR - litho (within the wheel)*****
- COLR - color wheel*****
- TILT - tilt
- PAN - pan
- CYAN - cyan wheel******
- BEAM - beam shaping (lenticular) wheel******
- YELW - yellow wheel******
- MAGN - magenta wheel******

*sensor information only available for Studio Spot 250 fixtures.
**sensor information only available for Studio Color 250 fixtures.

To view whether the specified sensor is working correctly:

`AddR`	1.	Press and hold the <Menu> button until "ADDR" appears on the LED display.
`INFO`	2.	Using the <Up> and <Down> arrow buttons, scroll to the "INFO" menu and press the <Enter> button to select the "INFO" menu.
`SENS`	3.	Using the <Up> and <Down> arrow buttons, scroll to the "SENS" menu and press the <Enter> button to select the "SENS" menu.
	4.	Using the <Up> and <Down> arrow buttons, scroll to the desired sensor (listed above) and press the <Enter> button to select the desired option. The LED will display "ON" if the sensor is obstructed (by a wheel tab), or "OFF" if the sensor is not obstructed (by a pan or tilt notch).

Resetting Fixture Hours (F/RS)

This menu item allows you to track the number of hours the fixture has bee operating.

To reset the fixture hours to zero:

| `AddR` | 1. | Press and hold the <Menu> button until "ADDR" appears on the LED display. |

`INFO` 2. Using the <Up> and <Down> arrow buttons, scroll to the "INFO" menu and press the <Enter> button to select the "INFO" menu.

`F/RS` 3. Using the <Up> and <Down> arrow buttons, scroll to the "F/RS" option and press the <Enter> button to select the "F/RS" option*****. The LED will display "0000" when the fixture hours are reset.

    *Note: This option has a 5-second delay to avoid inadvertent changes. To reset the fixture hours, you must press and hold the <Enter> button for at least 5 seconds.

Resetting Lamp Hours (L/RS)

This menu item allows you to track the number of hours the current lamp has been operating.

To reset the current lamp hours to zero:

`AddR` 1. Press and hold the <Menu> button until "ADDR" appears on the LED display.

`INFO` 2. Using the <Up> and <Down> arrow buttons, scroll to the "INFO" menu and press the <Enter> button to select the "INFO" menu.

`L/RS` 3. Using the <Up> and <Down> arrow buttons, scroll to the "L/RS" option and press the <Enter> button to select the "L/RS" option*****. The LED will display "0000" when the lamp hours are reset.

    *Note: This option has a 5-second delay to avoid inadvertent changes. To reset the lamp hours, you must press and hold the <Enter> button for at least 5 seconds.

Preset Menu (PRST)

The Preset menu allows you to turn preset playback off or on, create/edit a scene using the on-board memory to program the fixture for stand-alone operation, copy a scene from the on-board memory to another scene, and capture a scene from your controller to the on-board memory.

Setting Preset Playback (PLAY)

This menu option allows you to turn preset playback on or off and to view which scene is currently playing in preset playback mode. This menu option can be accessed for either user type A or user type B. However, you must *first* set the fixture to the desired user type - either user A or user B.

For more information on setting the user type, see "Setting the User Type (USER)" on page 4-26.

To set preset playback on or off, or to view the current scene:

AddR   1. Press and hold the <Menu> button until "ADDR" appears on the LED display.

PRST   2. Using the <Up> and <Down> arrow buttons, scroll to the "PRST" menu. (This will be the first menu displayed.) Press the <Enter> button to select the "PRST" menu.

PLAY   3. Using the <Up> and <Down> arrow buttons, scroll to the "PLAY" menu and press the <Enter> button to select the "PLAY" menu.

ON
or
OFF
or
SCN

4. Using the <Up> and <Down> arrow buttons, scroll to the "ON," "OFF," or "SCN" option and press the <Enter> button to select the desired option. "ON" turns preset playback ON; "OFF" turns preset playback OFF; "SCN" displays which scene is currently playing.

Note: Scene 1 *must* be programmed before the fixture can play back scenes.

Editing an On-Board Memory Scene (EDIT)

This menu item allows you to create or edit a scene using the fixture's on-board scene memory. Using this menu option, you can change the value of any construct in any of the on-board scenes. For detailed information on creating or editing a scene, see Chapter 5.

This menu option can be accessed for either user type A or user type B. However, you must *first* set the fixture to the desired user type - either user A or user B. For more information on setting the user type, see "Setting the User Type (USER)" on page 4-26.

To create/edit a scene:

AddR   1. Press and hold the <Menu> button until "ADDR" appears on the LED display.

PRST   2. Using the <Up> and <Down> arrow buttons, scroll to the "PRST" menu and press the <Enter> button to select the "PRST" menu.

EdIT   3. Using the <Up> and <Down> arrow buttons, scroll to the "EDIT" menu and press the <Enter> button to select the "EDIT" menu.

SN01
to
SN16

4. Using the <Up> and <Down> arrow buttons, scroll to the scene you want to edit and press the <Enter> button to select the desired scene.

Copying an On-Board Memory Scene (COPY)

`AddR`	1. Press and hold the <Menu> button until "ADDR" appears on the LED display.
`PRST`	2. Using the <Up> and <Down> arrow buttons, scroll to the "PRST" menu and press the <Enter> button to select the "PRST" menu.
`COPY`	3. Using the <Up> and <Down> arrow buttons, scroll to the "COPY" menu and press the <Enter> button to select the "COPY" menu.
	4. The LED will display "FROM." Press the <Enter> button to enter the "FROM" menu.
`FA01` to `FA16` **or** `Fb01` to `Fb16`	5. Using the <Up> and <Down> arrow buttons, scroll to the scene you want to copy from (source scene) for either user A ("FA01" - "FA16") or user B ("FB01" - "FB16"). Press the <Enter> button to select the desired scene.
	6. The LED will display "TO." Press the <Enter> button to enter the "TO" menu.
`TA01` to `TA16` **or** `Tb01` to `Tb16`	7. Using the <Up> and <Down> arrow buttons, scroll to the scene you want to copy to (destination scene) for either user A ("TA01" - "TA16") or user B ("TB01" - "TB16"). Press the <Enter> button to select the desired scene.

The fixture will copy the desired scene to the selected scene location. When the fixture finishes the copy successfully, "DONE" will appear briefly in the fixture's LED display.

Capturing a Preset Scene (CAPT)

Preset capturing is a way to automate the creation of scenes on multiple Studio Spot 250 and Studio Color 250 fixtures connected to a DMX 512 link. Use a DMX controller to create a scene, then save (capture) the scene into a fixture's presets to play back the scene without the controller. When capturing a scene into a fixture's presets, all construct values must be constant (i.e., there cannot be any pan/tilt movement or scene-to-scene sequencing).

This menu option can be accessed for either user type A or user type B. However, you must *first* set the fixture to the desired user type - either user A or user B. For more information on setting the user type, see "Setting the User Type (USER)" on page 4-26.

After creating a scene with your DMX controller, follow the instructions below for each fixture on which you want to capture preset scenes:

`AddR`	1. Press and hold the <Menu> button until "ADDR" appears on the LED display.

`PRST`

2. Using the <Up> and <Down> arrow buttons, scroll to the "PRST" menu and press the <Enter> button to select the "PRST" menu.

`CAPT`

3. Using the <Up> and <Down> arrow buttons, scroll to the "CAPT" menu and press the <Enter> button to select the "CAPT" menu.

`SN01`

to

`SN16`

4. Using the <Up> and <Down> arrow buttons, scroll to the scene you want to copy the preset scene to (destination scene) and press the <Enter> button.

Pressing the <Enter> button will copy the DMX-512 controller's preset scene to the selected scene on your fixture's on-board 16 scene memory for either user A or user B. When the fixture finishes the capture successfully, "DONE" will appear briefly in the fixture's LED display.

Note: You must use the fixture's on-board scene memory to *manually* select values for the XFAD and DLAY constructs, since a DMX controller will not transmit those construct values. For more information on preset programming, see Chapter 5.

Enabling the Preset Default (DFLT)

This menu item enables the factory-programmed preset sequence or fixture self-demo. Enabling this menu item will erase any pre-programmed scenes or construct values on your fixture's on-board memory.

This menu option can be accessed for either user type A or user type B. However, you must *first* set the fixture to the desired user type - either user A or user B. If you have pre-programmed scenes you do not wish to erase, you can set the fixture to a different user type (A or B) and then enable the preset default for the *different* user type (see "Setting the User Type (USER)" on page 4-26).

To enable the self-demo:

`AddR`

1. Press and hold the <Menu> button until "ADDR" appears on the LED display.

`PRST`

2. Using the <Up> and <Down> arrow buttons, scroll to the "PRST" menu and press the <Enter> button to select the "PRST" menu.

`dFLT`

3. Using the <Up> and <Down> arrow buttons, scroll to the "DFLT" menu and press the <Enter> button to select the "DFLT" menu. The LED display will show "OK?"

4. Press the <Enter> button to enable the self-demo or press <Menu> to exit the menu option.

Note: To play the fixture's self-demo, you must set preset playback on (see "Setting Preset Playback (PLAY)" on page 4-39).

Chapter 5
Preset Programming

Programming Overview

Before programming your fixtures, you must be aware of some programming terms and definitions. These terms are defined in this section.

Scene

A scene is a combination of the different construct values you choose. A *construct* is a unique fixture feature; for example, focus, color, or rotating effects. Each scene consists of all of the construct values you select and can be as simple or complex as you want.

When you play back more than one scene, it becomes a *sequence*. A sequence that continuously repeats is called a *loop*.

Studio Spot 250 and Studio Color 250 fixtures always play back all contiguously-programmed scenes in a continuous loop. The loop plays back until you either turn the fixture off or stop scene playback. You must create the scenes contiguously (in other words, scene 1, scene 2, scene 3, and so on without skipping a scene) because the fixture automatically repeats when it encounters the first unprogrammed scene.

DMX Controller vs. Stand Alone Operation

You may save time by programming your fixtures using a controller, and then capturing the scene to the on-board memory of multiple Studio Spot 250 or Studio Color 250 fixtures. However, because controllers cannot transmit crossfade (XFAD) or delay (DLAY) construct values, you must use preset programming to manually set those construct values for each fixture.

You can use either a controller or the fixture's on-board memory to create and play back scenes, but not both at the same time. In other words, you cannot create a scene using the on-board memory and play it back using a controller. You also cannot use a controller at the same time onboard scenes are playing.

When using a DMX controller, you can program an unlimited number of sequences and retain direct control over the Studio Spot 250 and Studio Color 250 fixtures at all times. Using preset programming, you can build one sequence (up to 16 preset

scenes) for each user type (user A and user B) per fixture. You can also synchronize scene playback for all fixtures on the link while operating in stand-alone mode. However, in stand-alone mode, once you begin playing back the sequence, you *do not* have direct control over the fixtures.

Macros

Each Studio Spot 250 and Studio Color 250 fixture is shipped with factory-programmed macros which allow you to quickly program complicated looks (such as a ballyhoo) in one scene. Each macro modifies a specific set of constructs, while allowing you to control the other constructs in the scene. For more information on which constructs are used in each macro, see "Appendix B Macros" on page B-1.

Because the fixture's macros and LAD (Laser Aiming Device) share the same menu option, you cannot use both the macros and the LAD at the same time.

MSpeed vs. Full Speed

Some constructs allow you to choose either full speed or MSpeed (motor speed) changes. A full speed change means the change is completed in the shortest length of time after the wheel starts moving. An *MSpeed* (motor speed) change occurs smoothly over the entire MSpeed time value you assign.

For example, if you choose a value of 10 seconds for an MSpeed color change from position 2 to position 4, the color wheel will take 10 seconds to move from position 2 to position 4. However, if your MSpeed value is longer than the crossfade or delay time, the color or litho change will not be complete before the next scene starts.

All fixtures that have the same MSpeed value will reach their destination at the same time, regardless of the distance travelled. A DMX table of MSpeed times is shown in Appendix A.

Ramp Open, Snap Shut

The shutter construct includes parameters named "Ramp open, snap shut," "Snap open, ramp shut," and "Ramp open, ramp shut." A snap is an instant shutter movement (opening or closing); the snap time never varies. What you can vary is the timing of the ramp, which is a gradual shutter movement. A lower value always means a longer ramp, and a higher value always means a shorter ramp.

Forward and Reverse Spins

A forward spin on all wheels and positions means the wheel or position spins clockwise as you are looking at the projected image. A reverse spin means the wheel or position spins counter-clockwise.

Preset Programming

This section provides an example of how to program your fixtures for stand-alone operation using the on-board memory in each fixture to create, store, and play back scenes. Preset programming involves accessing the fixture's menu system. For more information on how to access the menu system and a complete menu map of the preset programming options, see "Chapter 4 Understanding the Menu System" on page 4-1.

Creating a Scene - Step By Step Example

5

Follow the example below to create a sample scene using the fixture's menu system to choose a value for each of the fixture's available constructs. For more information on available construct parameters, see the menu map in Table 4-1 on page 4-2 or Table 4-2 on page 4-10.

Choosing a Scene to Create/Edit

`AddR` 1. Press and hold the <Menu> button until "ADDR" appears on the LED display.

`PRST` 2. Using the <Up> and <Down> arrow buttons, scroll to the "PRST" menu and press the <Enter> button to select the "PRST" menu.

`EdIT` 3. Using the <Up> and <Down> arrow buttons, scroll to the "EDIT" menu and press the <Enter> button to select the "EDIT" menu.

`SN01` 4. Using the <Up> and <Down> arrow buttons, scroll to the scene you want to create (in this example, "SN01") and press the <Enter> button to select the desired scene.

Opening the Shutter (SHUT)

`SHUT`   1. Using the <Up> and <Down> arrow buttons, scroll to the "SHUT" construct. (This will be the first construct displayed.) Press the <Enter> button to select the shutter construct.

`OPEN`   2. Using the <Up> and <Down> arrow buttons, scroll to the desired shutter value (in this example, "OPEN") and press the <Enter> button to select the desired value.

Selecting a Dim Value (DIM)

`dIM`   1. Using the <Up> and <Down> arrow buttons, scroll to the "DIM" construct and press the <Enter> button to select the dim construct.

`d255`   2. Using the <Up> and <Down> arrow buttons, scroll to the desired dim value (in this example, "D255") and press the <Enter> button to select the desired value.

Selecting a Pan Value (PAN)

`PAN`   1. Using the <Up> and <Down> arrow buttons, scroll to the "PAN" construct and press the <Enter> button to select the pan construct.

       2. Using the <Up> and <Down> arrow buttons, scroll to the desired pan value (from "-49.9" to "+49.9") and press the <Enter> button to select the desired value.

Selecting a Tilt Value (TILT)

`TILT`   1. Using the <Up> and <Down> arrow buttons, scroll to the "TILT" construct and press the <Enter> button to select the tilt construct.

       2. Using the <Up> and <Down> arrow buttons, scroll to the desired tilt value (from "-49.9" to "+49.9") and press the <Enter> button to select the desired value.

Choosing a Color Wheel Control Value (COLC)

`COLC`   1. Using the <Up> and <Down> arrow buttons, scroll to the "COLC" construct and press the <Enter> button to select the color wheel control construct.

`IdX`   2. Using the <Up> and <Down> arrow buttons, scroll to the desired color wheel control value (in this example, "IDX") and press the <Enter> button to select the desired value.

Selecting a Color Wheel Position (COL)

This menu option is only available for Studio Spot 250 fixtures.

`COL`   1. Using the <Up> and <Down> arrow buttons, scroll to the "COL" construct and press the <Enter> button to select the Color wheel position construct.

`C 12` 2. Using the <Up> and <Down> arrow buttons, scroll to the desired Color wheel position value (in this example, "C 12") and press the <Enter> button to select the desired value.

Selecting a Cyan Wheel Position (CYAN)

This menu option is only available for Studio Color 250 fixtures.

`CYAN` 1. Using the <Up> and <Down> arrow buttons, scroll to the "CYAN" construct and press the <Enter> button to select the cyan color wheel position construct.

`C 1`   2. Using the <Up> and <Down> arrow buttons, scroll to the desired cyan color wheel position value (in this example, "C 1") and press the <Enter> button to select the desired value.

Selecting a Magenta Wheel Position (MAGN)

This menu option is only available for Studio Color 250 fixtures.

`MAGN` 1. Using the <Up> and <Down> arrow buttons, scroll to the "MAGN" construct and press the <Enter> button to select the magenta color wheel position construct.

`OPEN` 2. Using the <Up> and <Down> arrow buttons, scroll to the desired magenta color wheel position value (in this example, "OPEN") and press the <Enter> button to select the desired value.

Selecting a Yellow Wheel Position (YELW)

This menu option is only available for Studio Color 250 fixtures.

`YELW` 1. Using the <Up> and <Down> arrow buttons, scroll to the "YELW" construct and press the <Enter> button to select the yellow color wheel position construct.

`S 3`   2. Using the <Up> and <Down> arrow buttons, scroll to the desired yellow color wheel position value (in this example, "S 3") and press the <Enter> button to select the desired value.

Choosing a Litho Wheel Control Value (LTOC)

This menu option is only available for Studio Spot 250 fixtures.

LTOC   1.   Using the <Up> and <Down> arrow buttons, scroll to the "LTOC" construct and press the <Enter> button to select the Litho wheel control construct.

FSP   2.   Using the <Up> and <Down> arrow buttons, scroll to the desired Litho wheel control value (in this example, "FSP") and press the <Enter> button to select the desired value.

Selecting a Litho Wheel Position (LTO)

This menu option is only available for Studio Spot 250 fixtures.

LTO   1.   Using the <Up> and <Down> arrow buttons, scroll to the "LTO" construct and press the <Enter> button to select the litho wheel position construct.

LF 2   2.   Using the <Up> and <Down> arrow buttons, scroll to the desired litho wheel position value (in this example, "LF 2") and press the <Enter> button to select the desired value.

Selecting a Litho Rotation (Within the Wheel) Value (LTR)

This menu option is only available for Studio Spot 250 fixtures.

LTR   1.   Using the <Up> and <Down> arrow buttons, scroll to the "LTR" construct and press the <Enter> button to select the litho rotation construct.

F080   2.   Using the <Up> and <Down> arrow buttons, scroll to the desired litho rotation (within the wheel) value (in this example, "F080") and press the <Enter> button to select the desired value.

Selecting an Effects Wheel Position (FX)

This menu option is only available for Studio Spot 250 fixtures.

FX   1.   Using the <Up> and <Down> arrow buttons, scroll to the "FX" construct and press the <Enter> button to select the Effects wheel position construct.

FX 2   2.   Using the <Up> and <Down> arrow buttons, scroll to the desired Effects wheel position value (in this example, "FX 2") and press the <Enter> button to select the desired value.

Selecting a Beam Shaping (Lenticular) Wheel Position (BEAM)

This menu option is only available for Studio Color 250 fixtures.

| bEAM | 1. | Using the <Up> and <Down> arrow buttons, scroll to the "FX" construct and press the <Enter> button to select the effects wheel position construct. |

| WR12 | 2. | Using the <Up> and <Down> arrow buttons, scroll to the desired effects wheel position value (in this example, "WR12") and press the <Enter> button to select the desired value. |

Selecting an Effects Wheel Rotation Value (FXR)

This menu option is only available for Studio Spot 250 fixtures.

| FXR | 1. | Using the <Up> and <Down> arrow buttons, scroll to the "FXR" construct and press the <Enter> button to select the effects wheel rotation construct. |

| R074 | 2. | Using the <Up> and <Down> arrow buttons, scroll to the desired effects wheel rotation value (in this example, "R074") and press the <Enter> button to select the desired value. |

Selecting the Focus Value (FCUS)

| FCUS | 1. | Using the <Up> and <Down> arrow buttons, scroll to the "FCUS" construct and press the <Enter> button to select the focus construct. |

| | 2. | Using the <Up> and <Down> arrow buttons, scroll to the desired lens focus value (for Studio Spot 250 fixtures) or beam angle value (for Studio Color 250 fixtures). Choose a value from "000" to "255" and press the <Enter> button to select the desired value. |

Selecting the Iris Value (IRIS)

This menu option is only available for Studio Spot 250 fixtures.

| IRIS | 1. | Using the <Up> and <Down> arrow buttons, scroll to the "IRIS" construct and press the <Enter> button to select the iris construct. |

| RS01 | 2. | Using the <Up> and <Down> arrow buttons, scroll to the desired iris position value (in this example, "RS01") and press the <Enter> button to select the desired value. |

Setting an MSpeed Value (MSPD)

`MSPd` 1. Using the <Up> and <Down> arrow buttons, scroll to the "MSPD" construct and press the <Enter> button to select the MSpeed construct.

`1.5` 2. Using the <Up> and <Down> arrow buttons, scroll to the desired MSpeed (in this example, "1.5") in decimal seconds and press the <Enter> button to select the desired value.

In this example, the MSpeed value only affects the pan and tilt constructs, because the pan and tilt values default to MSpeed time, and no other constructs with MSpeed values were chosen.

Choosing a Macro (MACR)

`MACR` 1. Using the <Up> and <Down> arrow buttons, scroll to the "MACR" construct and press the <Enter> button to select the macro construct.

`MCOF` 2. Using the <Up> and <Down> arrow buttons, scroll to the desired macro value (in this example, "MCOF") and press the <Enter> button to select the desired value.

Note: For a description of available macros, see "Appendix B Macros" on page B-1.

Setting a Crossfade Value (XFAD)

`XFAd` 1. Using the <Up> and <Down> arrow buttons, scroll to the "XFAD" construct and press the <Enter> button to select the crossfade construct.

`X 1.5` 2. Using the <Up> and <Down> arrow buttons, scroll to the desired crossfade value in increments of 0.1 or 1 (in this example, "1.5") and press the <Enter> button to select the desired value.

Note: The crossfade value will affect the DIM and FCUS constructs. Set the unit of time used for crossfade (seconds, minutes, or hours) using the TIME construct.

Setting a Delay Value (DLAY)

`dLAY` 1. Using the <Up> and <Down> arrow buttons, scroll to the "DLAY" construct and press the <Enter> button to select the delay construct.

`d 6.0` 2. Using the <Up> and <Down> arrow buttons, scroll to the desired delay value in increments of 0.1 or 1 (in this example, "6.0") and press the <Enter> button to select the desired value.

Note: The delay value determines the length of the scene. If you want all motor transitions to be completed before the next scene begins, XFAD must be less than or equal to DLAY. If XFAD is longer than DLAY, the transition will not be completed before the next scene begins. Set the unit of time used for delay (seconds, minutes, or hours) using the TIME construct.

Setting the Time Unit (TIME)

`TIME` 1. Using the <Up> and <Down> arrow buttons, scroll to the "TIME" construct and press the <Enter> button to select the time construct.

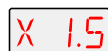`SEC`   2. Using the <Up> and <Down> arrow buttons, scroll to the desired time value (in this example, "SEC") and press the <Enter> button to select the desired value.

Note: This construct sets the unit of time used in for the XFAD values.

Erasing the Scene (ZERO)

`ZERO` 1. Using the <Up> and <Down> arrow buttons, scroll to the "ZERO" construct and press the <Enter> button to select the zero construct.

`OK?`   2. The LED will display "OK?" (In this example, press the <Menu> button.) Pressing the <Menu> button will exit this construct and leave the current scene as programmed. Pressing the <Enter> button will erase the scene and mark the end of a loop.

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Creating a Loop

A loop is a series of programmed scenes that continuously plays in sequential order. To create a loop, you must first create two or more contiguous scenes (see "Creating a Scene - Step By Step Example" on page 5-3). After you have created your scenes, go to the *next available* scene and choose the "ZERO" menu option to erase any programmed construct values and mark the end of a loop.

Note: If you program all available on-board scenes, you do not have to mark the end of the loop. When preset playback is set on, the fixture will automatically loop after playback of all programmed scenes.

Playing Back a Loop

To play back a loop, you must set preset playback mode on for each fixture (see "Setting Preset Playback (PLAY)" on page 4-39). When preset playback is set on, your fixture will automatically begin playing back the first scene and continue through the loop.

Note: You *must* program scene 1 to enable preset playback.

The fixture has two ways to indicate that preset playback is on two ways. First, the LED will display a dot in the lower right corner (see Figure 5-1). Second, during normal operation, the alphanumeric LED cycled information will be changed to display "PRST" instead of the fixture's software version ("Vxxx").

If power is removed during playback, when power is reapplied, the fixture will home and begin playback at the first scene. To stop playback, you must manually set playback mode off (see "Setting Preset Playback (PLAY)" on page 4-39).
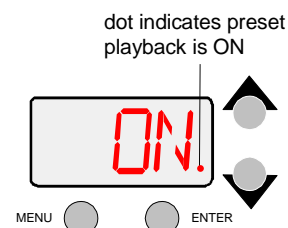

Figure 5-1. Preset playback indicator.

Synchronizing Preset Playback

After you have created one or more scenes for your fixtures, you can synchronize the preset scene playback for all Studio Spot 250, Studio Color 250, Studio Spot, Technobeam, Technopro, or Technoray fixtures in the link.

Note: Synchronizing preset playback is applicable for fixtures operating in stand-alone mode only. Do not include a DMX controller in the link while synchronizing preset scene playback.

Synchronizing playback allows you to set all applicable fixtures to a "master clock" so that all fixtures have a definite, synchronized starting point when playing back their sequences (or loops). It is the master fixture which determines the sequence length for *all* the fixtures in the link, regardless of the number of programmed scenes or the sequence length of the individual slave fixtures.

When the master fixture reaches the end of its last scene, *all* fixtures will restart at scene 1 (regardless of whether the slave fixtures have finished playing their scenes) and *all* the "clocks" will be reset to zero. For example, if a slave fixture has a shorter sequence length, it will continuously repeat its sequence until the master fixture resets

all the clocks (see Figure 5-2).   If a slave fixture has a longer sequence length, it will restart at scene 1 before it completes its entire sequence.
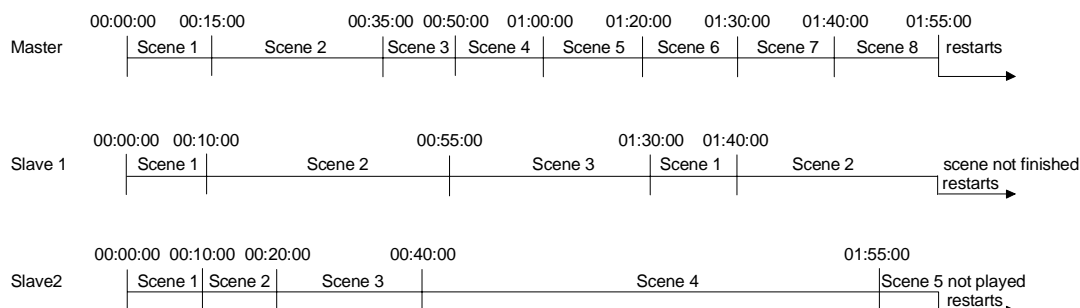
Figure 5-2. Example of synchronized playback.

To enable synchronized playback:

1. Link the fixtures you want to synchronize (see "Linking the Fixtures" on page 1-7).

    Make sure you terminate the last fixture in the link and that there are no DMX controllers on the link.

2. Assign one fixtures as the master fixture by assigning it a unique DMX start channel 1 or fixture number 1.

    Make sure *no other fixture* on the link is assigned DMX start channel 1 or fixture number 1.

3. Set preset playback on for all fixtures on the link (see "Setting Preset Playback (PLAY)" on page 4-39).

Note: If there is a controller on the link, or if more than one fixture is assigned a DMX start channel 1 or fixture number 1, the master fixture's LED will display "LINK BUSY ERR," wait for three minutes, then try to transmit the time code again.

Chapter 6
Laser Aiming Device (LAD™) Operation

If your Studio Spot 250 or Studio Color 250 fixture is fitted with the optional Laser Aiming Device (LAD), do not operate the laser until you have read and understand the precautions and recommended operation instructions listed in this chapter.

Intended Audience

Only qualified and trained employees approved by a laser safety officer should be assigned to install, adjust, and operate the laser equipment.

Safety Precautions

Anytime you use the Studio Spot 250 or Studio Color 250 LAD, you should follow the safety precautions listed below:

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Cautions: 1. **Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.**

2. **Using the Laser Aiming Device with any fixture other than Studio Spot 250 or Studio Color 250 may result in damage to both the laser and the fixture as well as exposure to laser radiation.**

3. **Do not point the laser at an audience.**

4. **Make sure that the laser beam is never directed at mirror-like (specular) surfaces (most importantly, at flat mirror-like surfaces).**

5. **When not in use, store the laser (fixture) in a location where unauthorized personnel cannot gain access to the laser.**

6. **Do not remove the labels shown in Figure 6-1. These labels are required by US and European safety agencies.**

Top view of fixture

Fixture with bezel removed
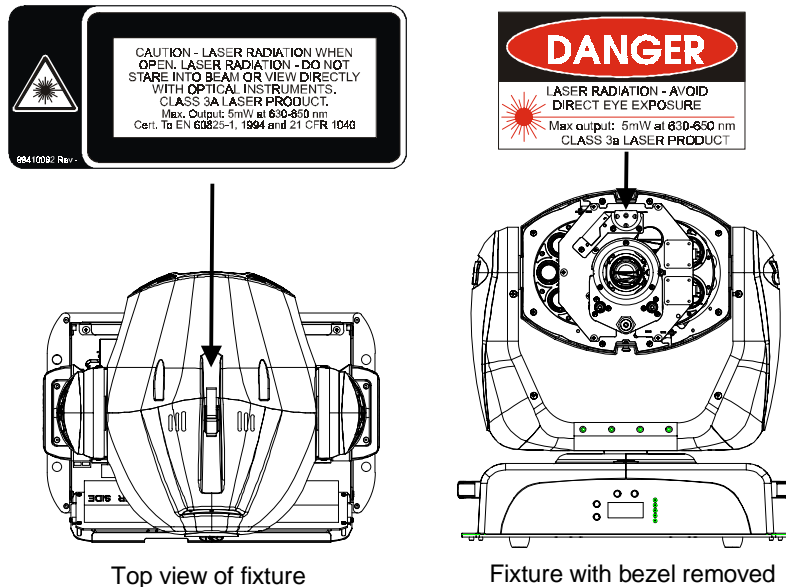
Figure 6-1. LAD™ labels on the fixture.

7. **Post a standard laser warning sign to mark areas where this product is used.**

8. **Do not stare directly into the beam and do not view the beam with optical instruments.**

9. **Always position the laser path well above or below eye level.**

10. **Terminate the laser beam at the end of its useful path.**

11. **Consult local and state laws regarding laser use and possible registration requirements.**

Overview of Operation

The Studio Spot 250 and Studio Color 250 LAD allows you to position the light beam during daylight or high ambient light conditions. With this additional flexibility, you can set up or verify the fixture's pan/tilt positions in conditions that would otherwise make beam positioning difficult or impossible.

Recommended Laser Use

The laser exits the fixture through the aperture shown in Figure 6-2.

The most effective and efficient way to use the laser aiming device is with the fixture's lamp off. There are two reasons for this:

- The higher the temperature, the shorter the life of the Laser Aiming Device. Keeping the lamp off minimizes the temperature inside the fixture, which extends the life of the laser.

- The higher the temperature, the less bright the laser will be. For example, when the fixture is operating with the lamp on, the internal temperature can reach 50° C (122° F), decreasing the laser power by about 25%.
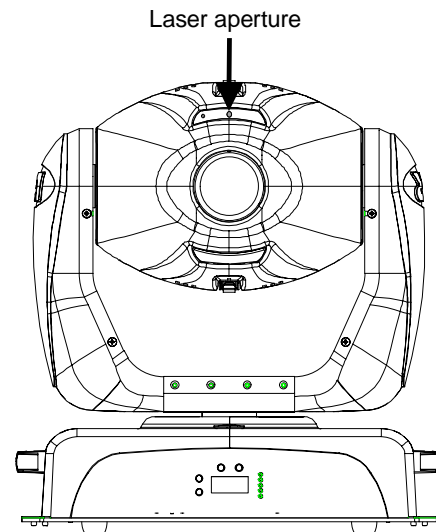
Laser aperture

Figure 6-2. Laser aperture.

You can control the laser using either the fixture's on-board menu system or a DMX-compatible controller. For more information on using a DMX controller to access the laser, see "Control" on page 3-14. For more information on using preset programming to access the laser, see Table 4-1 on page 4-2 or Table 4-2 on page 4-10.

Aligning the Laser

For Studio Spot 250 fixtures, the laser should ideally be 3.3 in. (8.4 cm) directly above the center point of a perfectly round light beam. For Studio Color 250 fixtures, the laser should ideally be 3.5 in. (8.9 cm) directly above the center point of a perfectly round light beam (see Figure 6-3).

In its ideal position, the laser path is parallel to the path of the light and will stay at 3.3 in. (for Studio Spot 250 fixtures) or 3.5 in. (for Studio Color 250 fixtures) above the center point of the beam at any throw distance or pan/tilt position.

Studio Spot 250 fixture   3.3 in. (8.4 cm)

Studio Color 250 fixture   3.5 in. (8.9 cm)
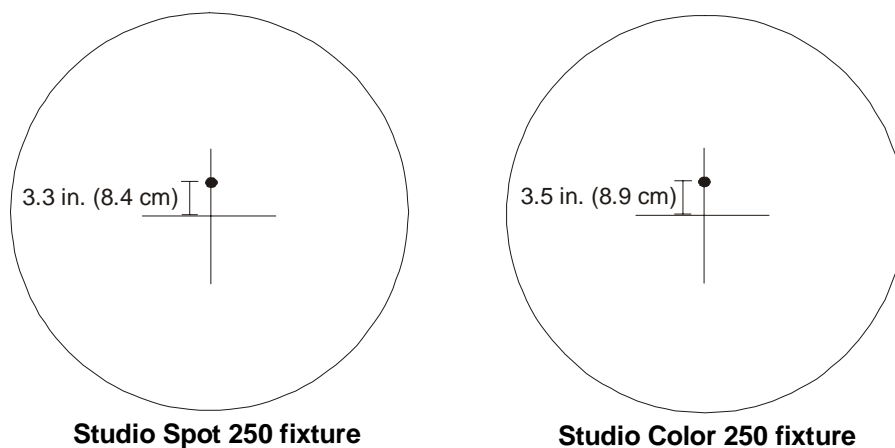
Figure 6-3. Ideal position of the laser.

You might need to realign the laser periodically in order to maintain its optimal position. However, the decision of whether or not to align the laser is entirely up to you. If the laser strays from its optimal position, but it gives you enough accuracy for your needs, you do not *have to* align it.

Alignment Procedure

You can use either the fixture's on-board menu system or your DMX controller to complete the alignment procedure below.

1. Physically orient the fixture so the beam will point toward a white wall no less than 10 ft. (3 m) away (see Figure 6-4).

white wall

sturdy surface

10 ft. (3 m) minimum
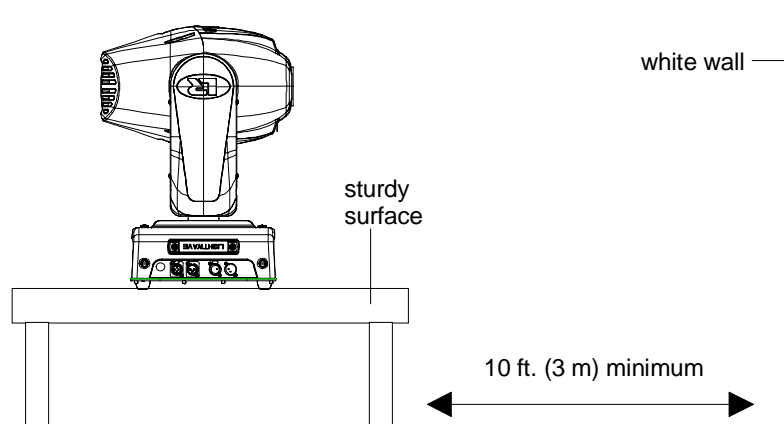
Figure 6-4. Orient the fixture for laser alignment.

Note: The farther away the wall is, the more accurate your positioning will be):

2. Remove the fixture's bezel cover by releasing the two bezel latches (see Figure 6-5).

release the two bezel latches

fixture with bezel removed
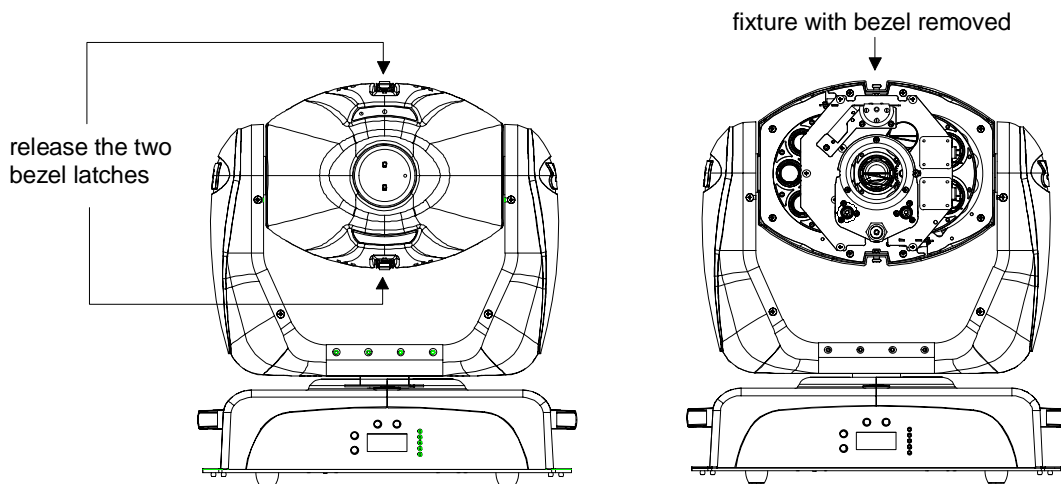
Figure 6-5. Remove the bezel.

3. Turn the lamp on (see "Turning the Lamp On or Off (LAMP)" on page 4-30).

4. Make sure that the light beam is round and not oval. If necessary, adjust the pan and tilt construct values until the beam is round (see "Selecting a Pan Value (PAN)" on page 5-4 and "Selecting a Tilt Value (TILT)" on page 5-4).

5. For Studio Spot 250 fixtures, adjust the focus until the edge of the light beam is sharp (see "Selecting the Focus Value (FCUS)" on page 5-7).

6. Find the approximate center of the beam using either a tape measure or ruler, and mark a spot 3.3 in. (for Studio Spot 250 fixtures) or 3.5 in. (for Studio Color 250 fixtures) above the center of the beam where the laser should be positioned (see Figure 6-6).

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1 Extend the tape measure or ruler through the vertical center of the beam.
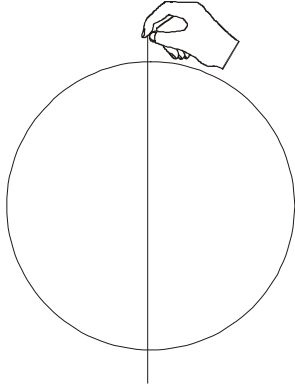
2 Lightly mark the center of the beam on the wall along the ruler.
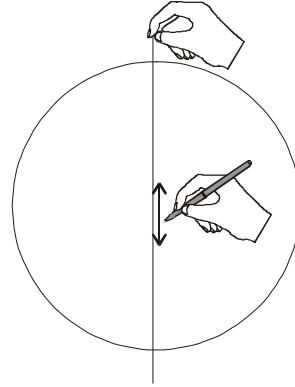
3 Extend the tape measure or ruler across the horizontal center of the beam and lightly mark the center of the beam on the wall along the ruler.
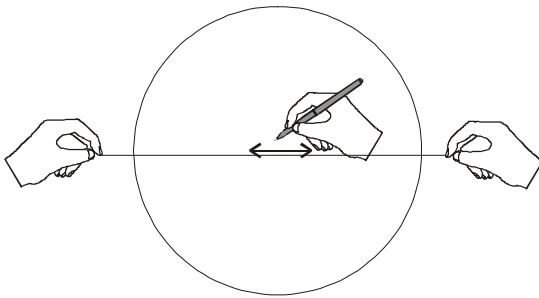
4 Measure 3.3 in (8.4 cm) for Studio Spot 250 fixtures, or 3.5 in. (8.9 cm) for Studio Color 250 fixtures above the center point of the marks you made on the wall to mark where the laser should shine.
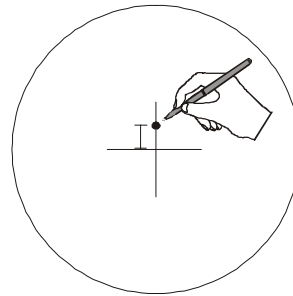
Figure 6-6. Locate the center of the beam on the wall and mark the ideal laser position.

7. Once you have marked the ideal laser position, turn the lamp off and set the LAD continuously on (see "Choosing a Macro (MACR)" on page 5-8, and choose the "LRON" menu option).

8. Look at the wall where the laser is projected to determine the current laser position in relation to the mark you made on the wall for the ideal laser position.

⚠ **Caution:** **Do not stare into the laser beam or view it directly with optical instruments.**

9. Locate the three mounting/alignment screws on the laser aiming device assembly (see Figure 6-7). These three screws can be used to adjust the position of the laser beam.
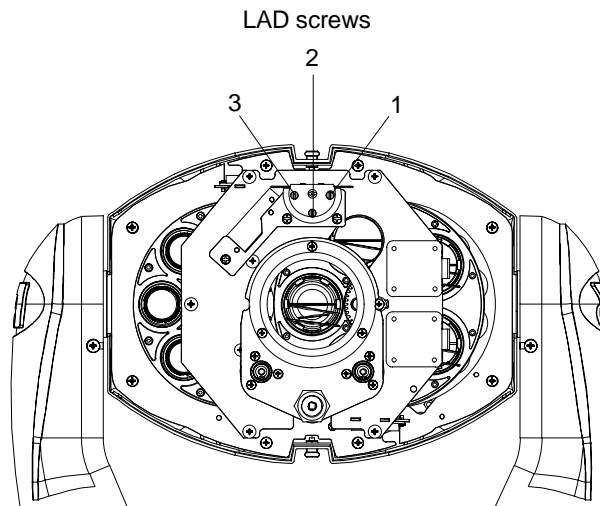
LAD screws

Figure 6-7. LAD™ mounting/alignment screws.

10. Alignment screws 1 and 3 (shown in Figure 6-7) move the laser beam horizontally, and screw 2 moves the laser beam vertically. Use the three alignment screws to adjust the position of the laser so that it is positioned at the ideal laser position of 3.3 in. (for Studio Spot 250 fixtures) or 3.5 in. (for Studio Color 250 fixtures) directly above the center point of a perfectly round light beam.

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After you tighten/loosen each screw, release pressure from the screwdriver before looking at the laser position on the wall. Applying pressure to the screw can change the laser's position.

Note: If you have difficulty aligning the laser or turning the screws, loosen all three screws and start over.

11. When the laser is aligned (or at a position you think will give you enough accuracy for your needs) you are finished.

12. Turn the LAD off (see "Choosing a Macro (MACR)" on page 5-8, and choose the "LROF" menu option).

13. Replace the bezel cover and engage the two bezel latches.

Chapter 7
General Maintenance

This chapter includes information on replacing parts, installing optional accessories, and cleaning your fixture. Please note the warnings under each heading before servicing your fixture.

Warning: This fixture must be serviced by qualified personnel. The information listed in this chapter is intended to assist qualified personnel *only*.

Replacing Parts

Warnings: Disconnect power before servicing.

Replace fuses with the specified type and rating only.

Equipment surfaces may reach temperatures up to 130° C (266° F). Allow the fixture to cool before handling.

Replacing Fuses

You will need:
* replacement fuse (see Table 7-1)
* wide tip, flat head screwdriver
* #1 Phillips-head screwdriver

To replace any of the three fuses located on the fixture's circuit board:

1. Electrically isolate the fixture. If the fixture has been operating, allow the fixture to cool before handling.

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2. Determine which fuse to replace by referring to Table 7-1.

Table 7-1. Description and Function of Fuses

Fuse	Type and Rating	Size	Protects	Symptom of Failure
F1	6.3 A, 250 V, Fast Blow only	5mm x 20mm	Motor supply and fan supply	If the fixture is operating normally and this fuse blows, the LAD (if applicable) and the lamp will turn off, the motor LED will be off, and the motors will not move. If power is cycled when this fuse is already blown, the LED alphanumeric display panel will remain blank.
F2	2.5 A, 250 V, Fast Blow only	5mm x 20mm	Logic board	Fixture shuts down, motor LED may be on.
F3	6.3 A, 250 V, Slow Blow only	5mm x 20mm	Main fuse	Fixture shuts down, all status LEDs are off, the fixture will not receive power.

3. Using a wide-tip, flat head screwdriver, loosen the two panel cover retaining screws *on each side of the fixture* and remove the fixture's two panel covers (see Figure 7-1).

two panel retaining screws   two panel covers
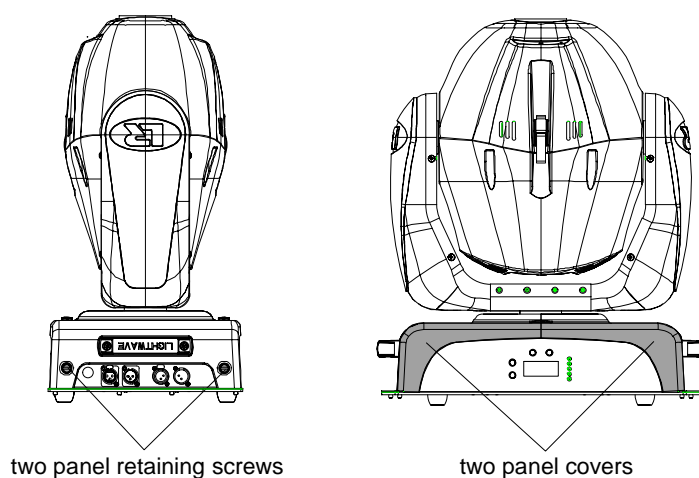
Figure 7-1. Remove the two panel covers.

4. Using a Phillips-head screwdriver, loosen (*but do not remove*) the two display panel retaining screws (see Figure 7-2).

LED display panel retaining screw
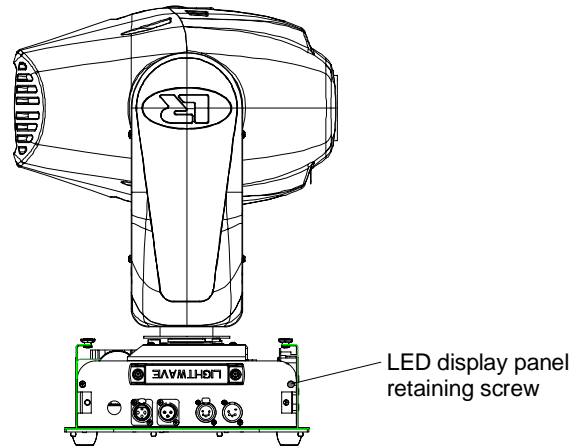
Figure 7-2. Loosen the two display panel retaining screws.

5. Gently lower the display panel to access the fuses on the circuit board (see Figure 7-3). Support the display panel while replacing the fuse. *Do not allow the cables on the circuit board to support the weight of the display panel.*

6. Locate the fuse to be replaced (see Figure 7-4).

Note: If you are replacing the F3 fuse, you must first remove the protective plastic covering over the fuse.

gently lower the display panel
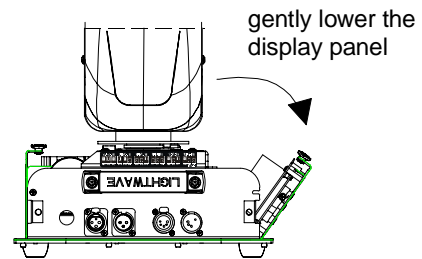
Figure 7-3. Lower the display panel.

7

F3
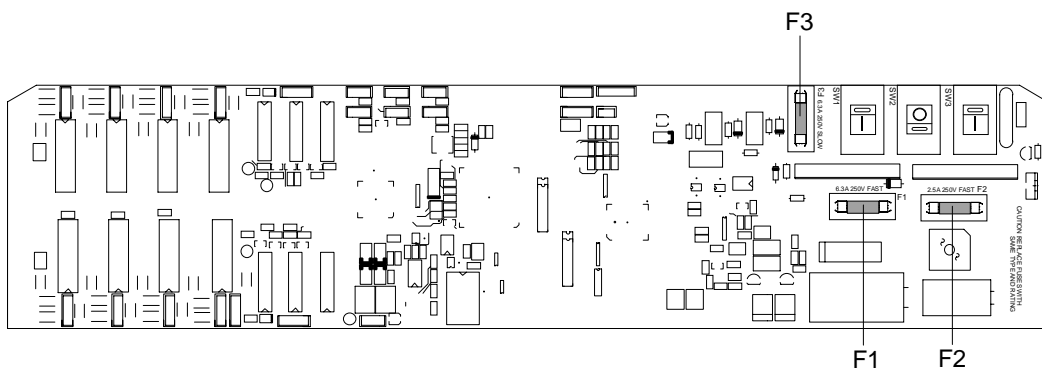
Figure 7-4. Fuses on the circuit board.

7. Replace the appropriate fuse(s) with a fuse of the same type and rating.

Note: If you replaced the F3 fuse, reinstall the protective plastic covering over the fuse.

8. After replacing the fuse, return the display panel to its original position and tighten the two display panel retaining screws.

9. Replace the two panel covers and tighten the four panel cover retaining screws.

Replacing the Lamp

Warnings: **Disconnect power before re-lamping or servicing.**

An operating, unshielded MSD lamp emits ultraviolet and visible (UV-vis) radiation which could damage eyes and skin. Whenever you are working on or near an exposed lamp, wear protective eye gear. Never look directly at the lamp while the lamp is on.

Hot lamp may be an explosion hazard. Do not open for five minutes after switching off. Wear eye and hand protection when re-lamping.

Equipment surfaces may reach temperatures up to 130° C (266° F). Allow the fixture to cool before handling.

Caution: **This equipment is designed for use with a Philips® MSD 250/2, 250 watt, metal halide lamp only. Use of any other type lamp may be hazardous and may void the warranty.**

You will need:
• Philips® MSD 250/2, 250 watt, metal halide lamp
• protective gloves and eyewear
• wide tip, flat head screwdriver

To install/replace the lamp:

1. Electrically isolate the fixture. If the fixture has been operating, wait for the lamp to cool before handling.

2. Put on your protective eyewear and gloves.

3. Tilt the fixture's head to access the lamp cap (see Figure 7-5).
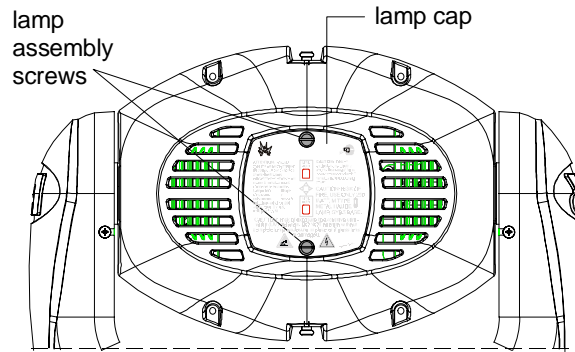
Figure 7-5. Lamp cap and lamp assembly screws.

4. Using a wide tip, flat head screwdriver, loosen (*but do not remove*) the two lamp assembly screws (see Figure 7-5).

5. Pull the lamp assembly straight out of the fixture (see Figure 7-6).
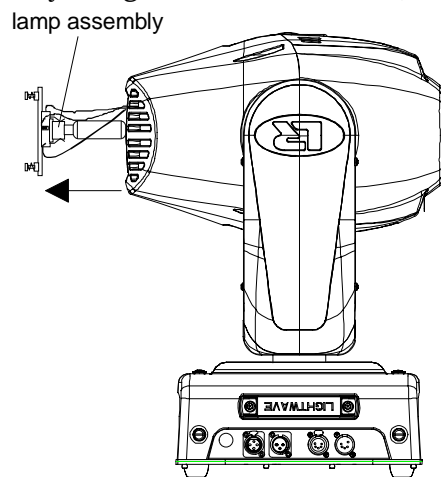
Figure 7-6. Remove the lamp assembly.

The lamp assembly is connected to the fixture by lamp socket wires (see Figure 7-6). Support the lamp assembly while replacing the lamp. *Do not allow the lamp socket wires to support the weight of the lamp assembly.*

6. Holding the existing lamp by its ceramic base, carefully pull the lamp straight out of the lamp socket (see Figure 7-7).

⚠️ **Caution: Do not squeeze the lamp glass while removing the existing lamp from the socket. Lamp glass may shatter.**

7. Remove all packaging materials from the new lamp. Holding the new lamp by its ceramic base, gently press the two base pins into the lamp socket until the lamp is firmly seated.

Figure 7-7. Remove the lamp from the lamp socket.

⚠️ **Caution: When handling the new lamp, avoid contact with the lamp glass. If the lamp glass is soiled by oil or dirt from skin, gloves, etc., clean the cold lamp glass with an alcohol wipe. A soiled lamp could overheat and burst, causing damage to the fixture.**

8. Reinsert the lamp assembly straight into the fixture.

   Make sure the lamp socket wires are not wrapped around the lamp and that are not crimped while reinserting the lamp assembly.

9. Tighten the lamp assembly screws.

10. Reset the lamp hours to zero so that you can track the lamp life (see "Resetting Lamp Hours (L/RS)" on page 4-39).

11. Optimize the new lamp (see "Optimizing the Lamp" on page 7-19).

Replacing Studio Spot™ 250 Wheel Components

This section explains how to remove and replace individual components in the Color, Litho, and effects wheels for Studio Spot 250 fixtures. You can install any dichroic, gobo, litho, or effect in Studio Spot 250 or Studio Color 250 fixtures that adheres to the specifications listed in the section titled "Dichroic, Litho, and Effect Specifications" on page intro-7.

You can replace dichroics, lithos, or effects if they are damaged or broken, to change their order in the wheel, to clean them, or to install a new or custom dichroic, litho, or effect. (See "Optional Accessories" on page intro-8 for ordering information.)

If applicable, remove all pieces of broken glass in the fixture when you replace the dichroic, litho, or effect.

Warnings: **Disconnect power before servicing.**

Equipment surfaces may reach temperatures up to 130° C (266° F). Allow the fixture to cool before handling.

Replacing Dichroics

To replace a dichroic in the color wheel:

1. Remove the fixture's bezel cover by releasing the two bezel latches (see Figure 7-8).
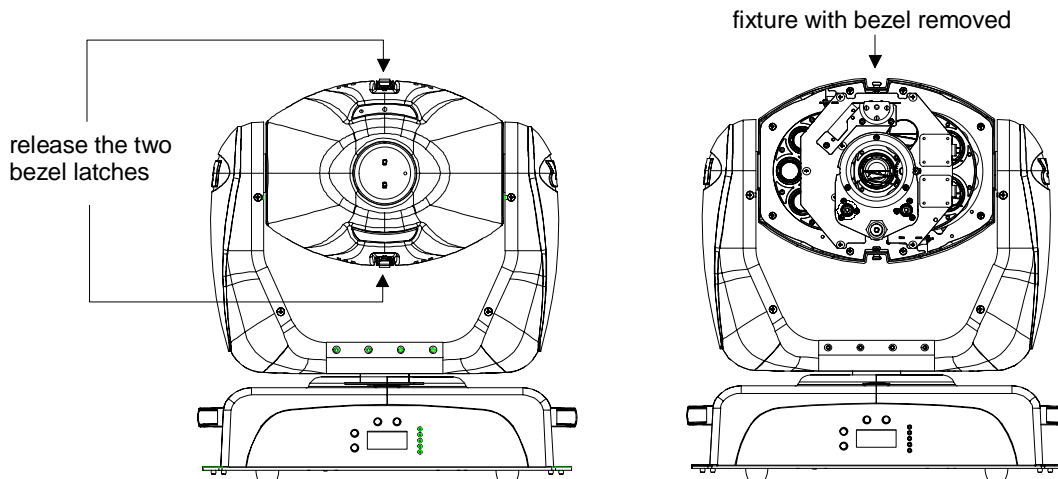
Figure 7-8. Remove the fixture's bezel.

fixture with bezel removed

release the two
bezel latches

7

2. Locate the cutout on the mid plate under the color wheel (see Figure 7-9). Manually rotate the color wheel until the dichroic you wish to replace is directly over the cutout.
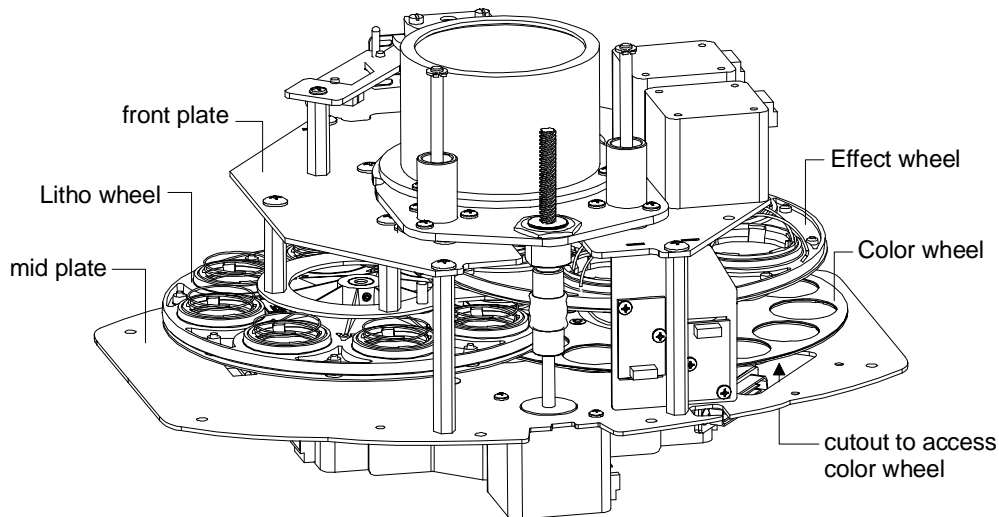
Figure 7-9. Cutout on the mid plate under the color wheel.

3. Place your finger through the cutout and push the dichroic you wish to replace toward the center of the wheel (and under the retaining clip) to free it from the two wheel tabs as shown in Figure 7-10.
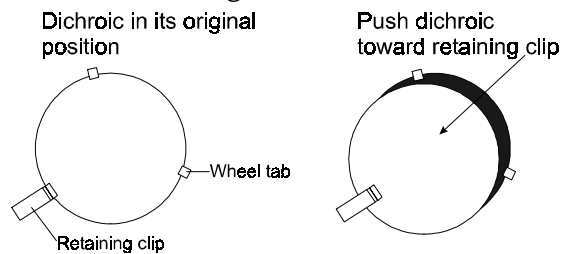
Figure 7-10. Free the dichroic by pushing it toward the retaining

4. Once the dichroic is free of the two wheel tabs, angle the free end up and pull the dichroic out of the wheel.

5. Orient the new dichroic so that the coated side of the dichroic is facing *away from the lamp*.

   To determine which side of the dichroic is coated, place the tip of a pen against each side of the dichroic. Look at the dichroic and pen from a slight angle.

   On the coated side, the tip of the pen appears to "touch" its reflection. On the uncoated side, there appears to be a gap between the pen and its reflection (see Figure 7-11).

6. Install the new dichroic in the color wheel by pushing it under the large retaining clip, then pulling it back so it fits under the two wheel tabs.

coated

uncoated

Figure 7-11. Determining the coated side of dichroic glass.

7. After replacing the dichroic, you may need to clean it by using a soft, lint-free cotton cloth and a mild glass cleaning solution (*containing no ammonia*).

8. Replace the bezel and engage the two bezel latches unless there are other dichroics, lithos, or effects you want to replace.

Replacing Lithos

To replace a litho in the litho wheel:

1. Remove the fixture's bezel cover by releasing the two bezel latches (see Figure 7-8).

2. Manually rotate the litho wheel until the litho you wish to replace is easy to access (see Figure 7-9).

3. Locate the four plastic tabs built into the wheel housing (see Figure 7-12).

4. Locate the tip of the metal spring (which should be under one of the four plastic tabs).

5. Carefully grasp the tip of the spring with your finger and pull it out from under the tab.

6. Rotate the spring as you remove it from the wheel.

Wheel tab

Tip of spring (under tab)
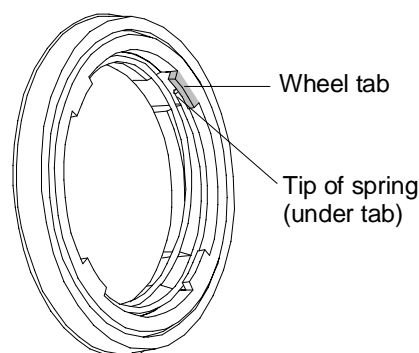
Figure 7-12. Location of the spring and built-in plastic tab on the wheel housing.

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You may need to continue pressing the spring tip under each plastic tab until the spring is completely free of the wheel housing.

7. After removing the spring, remove the rotating litho and its aperture ring (if present) from the wheel.

litho   aperture ring
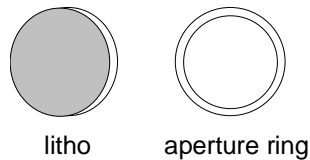
Figure 7-13. Rotating litho and aperture ring.

Note: The aperture ring is used with multi-color lithos because the colors do not completely bleed to the edge of the litho. The aperture ring serves as a light block to provide an even edge on a multi-color litho.

8. There are two kinds of lithos in the litho wheel: a *rotating litho* and a *static litho* (located directly behind the rotating litho) (see Figure 3-6 on page 3-9).

If you want to remove the static litho, you must first remove the rotating litho in front of the static litho by completing steps 1-5 above. Then, carefully spread the outer edge of the wheel apart and slide the static litho out of the wheel as shown Figure 7-14.

slide static litho out

gently separate the edge of the wheel

9. Orient the new litho (either static or rotating) so that the coated (or "bumpy") side of the litho is facing *away from the lamp*.
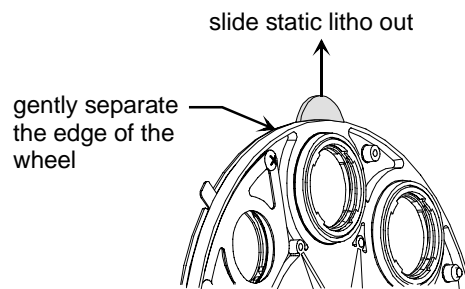
Figure 7-14. Removing a static litho.

To determine which side of the litho is coated, place the tip of a pen against each side of the litho. Look at the litho and pen from a slight angle.

On the coated side, the tip of the pen appears to "touch" its reflection. On the uncoated side, there appears to be a gap between the pen and its reflection (see Figure 7-11).
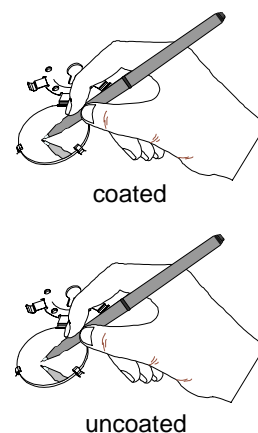
Note: If you are replacing a *single* litho in the wheel, or a *textured* (i.e., "bumpy") litho, you *must* orient the litho with the coated side facing away from the lamp.

However, if you are replacing a rotating litho *with a static litho behind it*, you can choose to orient the coated side facing the static litho for different focusing options. If the coated side of the top litho is facing

toward the bottom litho, you can produce moiré effects. If the coated side of the top litho is facing away from the lamp, you can produce morphing effects. For more information, see "Litho Position" on page 5-9.

10. To replace a static litho, gently spread the outer edge of the wheel apart and slide the static litho into the wheel. Make sure the static litho is seated in the two retaining slots and that the gap between the edges of the wheel is uniform (see Figure 7-15).

To replace a rotating litho, place the litho into the wheel housing and place the aperture ring (if applicable) over the litho.

gap on the edge of the wheel

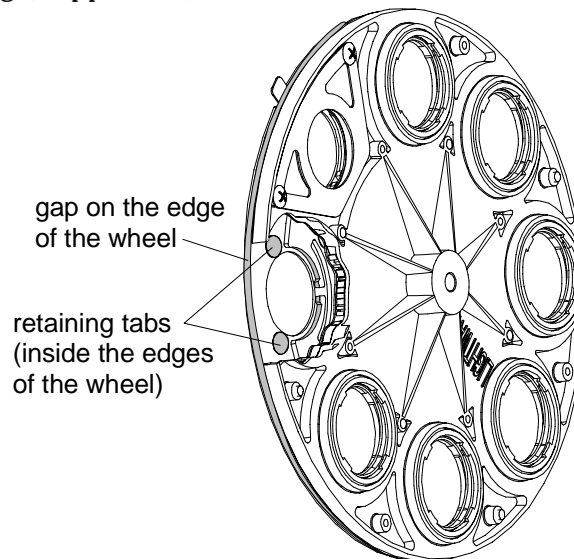retaining tabs (inside the edges of the wheel)

Figure 7-15. Replacing a static litho.

11. Install the metal spring by inserting the spring into the wheel housing (over the litho and aperture ring) and rotating the spring while pressing down. When

the spring is completely installed in the wheel, press the spring tip under one of the four plastic tabs in the wheel housing (see Figure 7-16).

Wheel tab

Correct placement
(spring tip is completely
under the tab)

Incorrect placement
(spring tip protrudes from
under the tab)

Figure 7-16. Replacing the spring on a rotating litho or effect.

12. After replacing the litho, you may need to clean it by using a soft, lint-free cotton cloth and a mild glass cleaning solution (*containing no ammonia*).

13. Replace the bezel and engage the two bezel latches unless there are other dichroics, lithos, or effects you want to replace.

Replacing Effects

To replace an effect in the effects wheel:

1. Remove the fixture's bezel cover by releasing the two bezel latches (see Figure 7-8).

2. Manually rotate the effects wheel until the effect you wish to replace is easy to access (see Figure 7-9).

3. Locate the four plastic tabs built into the wheel housing (see Figure 7-12).

4. Locate the tip of the metal spring (which should be under one of the four plastic tabs).

   Carefully grasp the tip of the spring with your finger and pull it out from under the tab.

5. Rotate the spring as you remove it from the wheel.

   You may need to continue pressing the spring tip under each plastic tab until the spring is completely free of the wheel housing.

6. After removing the spring, remove the effect from the wheel housing.

7. Orient the new effect so that the "bumpy" side of the effect is facing *away from the lamp*.

8. Place the new effect into the wheel housing and replace the metal spring.

9. Install the metal spring by inserting the spring into the wheel housing (over the effect) and rotating the spring while pressing down.

   When the spring is completely installed in the wheel, press the spring tip under one of the four plastic tabs in the wheel housing (see Figure 7-16).
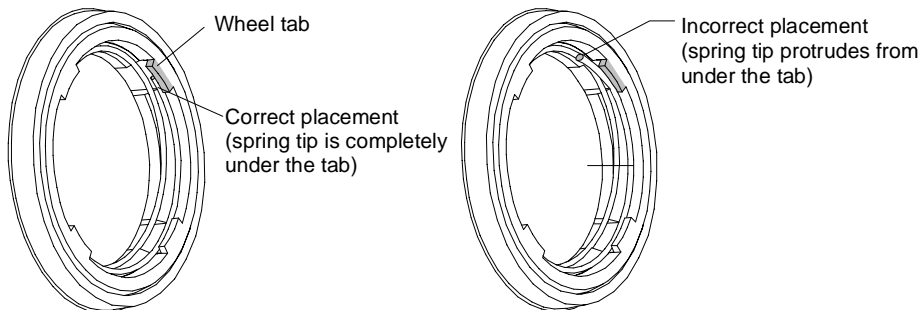
10. After replacing an effect, you may need to clean it by using a soft, lint-free cotton cloth and a mild glass cleaning solution (*containing no ammonia*).

11. Replace the bezel and engage the two bezel latches unless there are other dichroics, lithos, or effects you want to replace.

Replacing a Studio Color® 250 Wheel

This section shows how to replace the cyan, magenta, yellow, or beam shaping (lenticular) wheel. You should replace the wheels if they are damaged or broken. (See "Optional Accessories" on page intro-8 for ordering information.)

Warnings: **Disconnect power before servicing.**

Equipment surfaces may reach temperatures up to 130° C (266° F). Allow the fixture to cool before handling.

You will need:

- C-clip tool
- #2 Phillips-head screwdriver
- 5/64 in. hex tool
- replacement wheel

To replace a Studio Color 250 wheel:

1. Remove the fixture's bezel by releasing the two bezel latches (see Figure 7-17).

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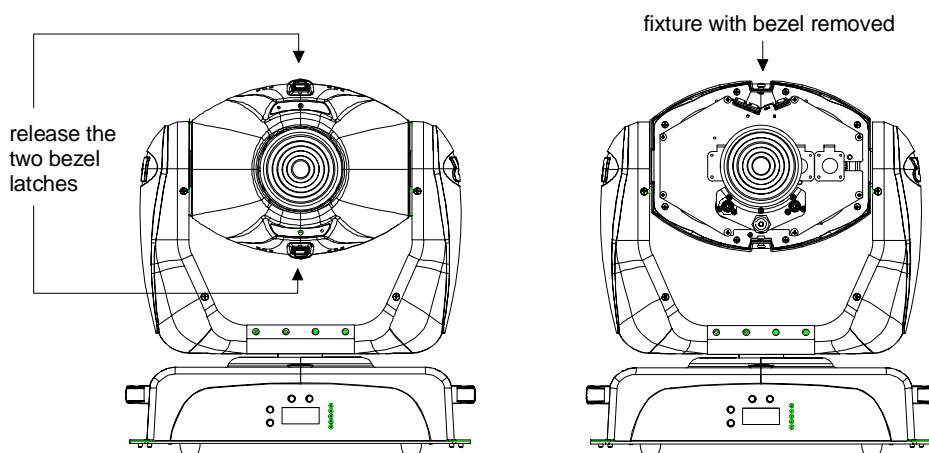
Figure 7-17. Remove the fixture's bezel.

2. Using a C-clip tool, remove the two C-clips from the lens shafts (see Figure 7-18).
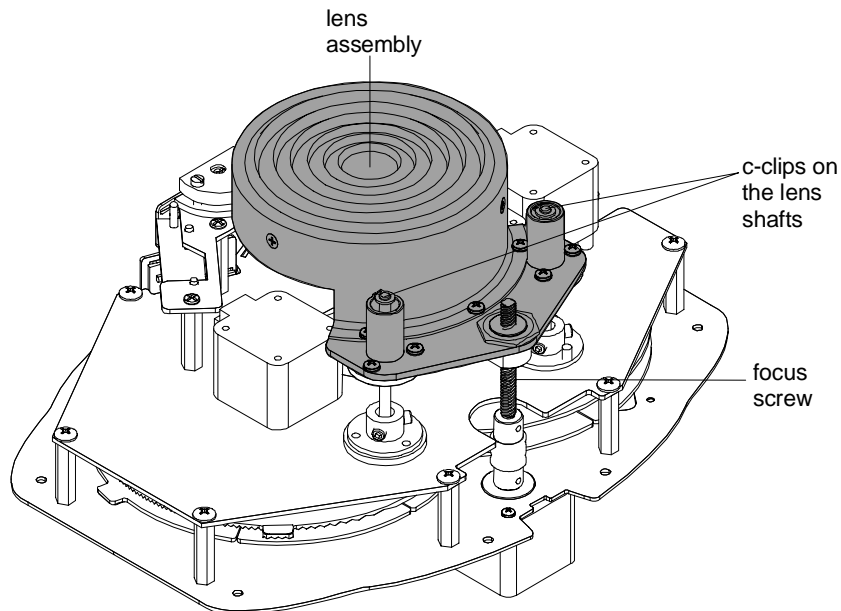
Figure 7-18. Location of the C-clips, lens shafts, focus screw, and lens assembly.

3. Remove the lens assembly by rotating the focus screw while pulling the assembly up and off of the lens shafts (see Figure 7-18).

4. Remove the eight #2 Phillips-head screws from the optical assembly front plate (see Figure 7-19).

5. Carefully separate the optical assembly by folding the front plate back toward the sensor bracket (see Figure 7-20).
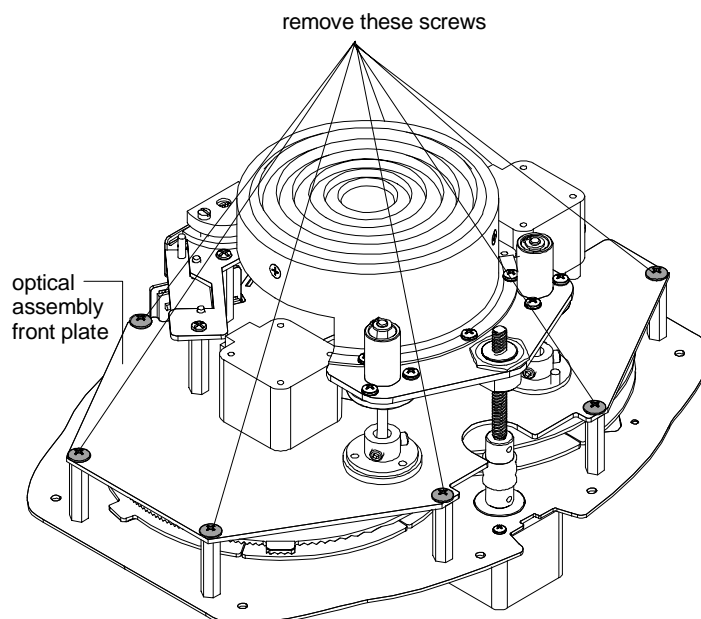
Figure 7-19. Location of the eight screws on the optical assembly front plate.

Support the front plate while replacing the wheel. *Do not allow the cables on the sensor bracket to support the weight of the front plate.*
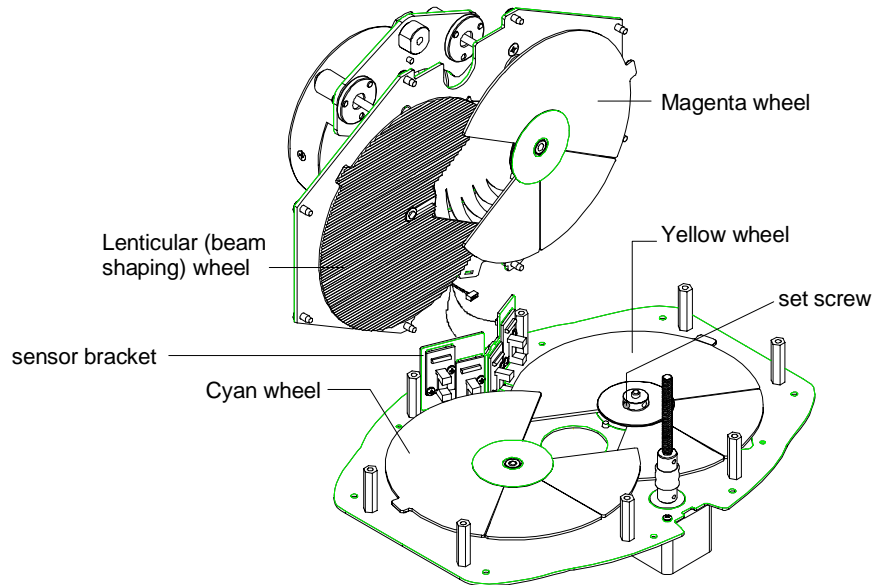
Figure 7-20. Optical assembly cover plate folded toward the sensor bracket.

6. Using a 5/64" hex tool, loosen the set screw on the desired wheel hub, and pull the desired wheel up and off the shaft (see Figure 7-20).

    If applicable, remove all pieces of broken glass in the fixture.

7. Place the new wheel on the open wheel shaft and tighten the wheel's set screw.

8. Carefully replace the optical assembly cover plate, and replace the eight #2 Phillips-head screws on the front plate.

9. Replace the lens assembly on the lens shafts.

    Press down on the lens assembly while rotating the focus screw to thread the focus screw on the lens assembly Rotate the focus screw until there is enough room on the top of the lens shafts to replace the two C-clips.

10. Using a C-clip tool, replace the two C-clips to the top of the lens shafts.

11. Replace the bezel by engaging the two bezel latches.

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Replacing the Lens

You can replace the lens if it is damaged or broken, or to install an optional accessory lens to achieve a different beam angle such as medium flood or extra wide flood (see "Optional Accessories" on page intro-8).

Warnings: **Disconnect power before servicing.**

Equipment surfaces may reach temperatures up to 130° C (266° F). Allow the fixture to cool before handling.

Replacing the Studio Spot™ 250 lens

You will need:

- replacement lens
- #2 Phillips-head screwdriver.

To replace the Studio Spot 250 lens:

1. Electrically isolate the fixture. If the fixture has been operating, allow the fixture to cool before handling.

2. Remove the bezel by unlatching the two bezel latches (see Figure 7-8).

3. Remove the three #2 Phillips-head lens screws which secure the lens to the lens assembly (see Figure 7-21).

4. Remove the lens by pulling it straight up from the assembly.

remove the three lens screws and pull
the lens straight up from the assembly

lens

Figure 7-21. The three lens screws.

5. Place the new lens in the assembly.

Note: Before installing the new lens, you may need to clean it by using a soft,
           lint-free cotton cloth and a mild glass cleaning solution (*containing no
           ammonia*).

6. Replace and tighten the three #2 Phillips-head lens screws that secure the lens
   to the lens assembly.

7. Replace the bezel and engage the bezel latches.

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Replacing the Studio Color® 250 lens

You will need:

- replacement lens
- #2 Phillips-head screwdriver

To replace the Studio Color 250 lens:

1. Electrically isolate the fixture. If the fixture has been operating, allow the
   fixture to cool before handling.

2. Remove the bezel by unlatching the two bezel latches (see Figure 7-17).

3. Remove the three #2 Phillips-head lens screws and remove the lens by pulling it straight up from the assembly (see Figure 7-22).

remove the three lens screws and pull
the lens straight up from the assembly
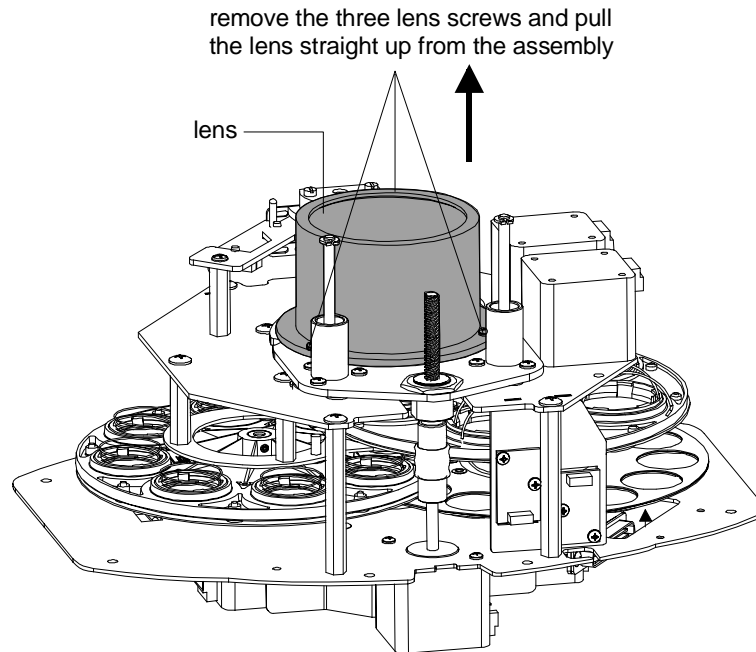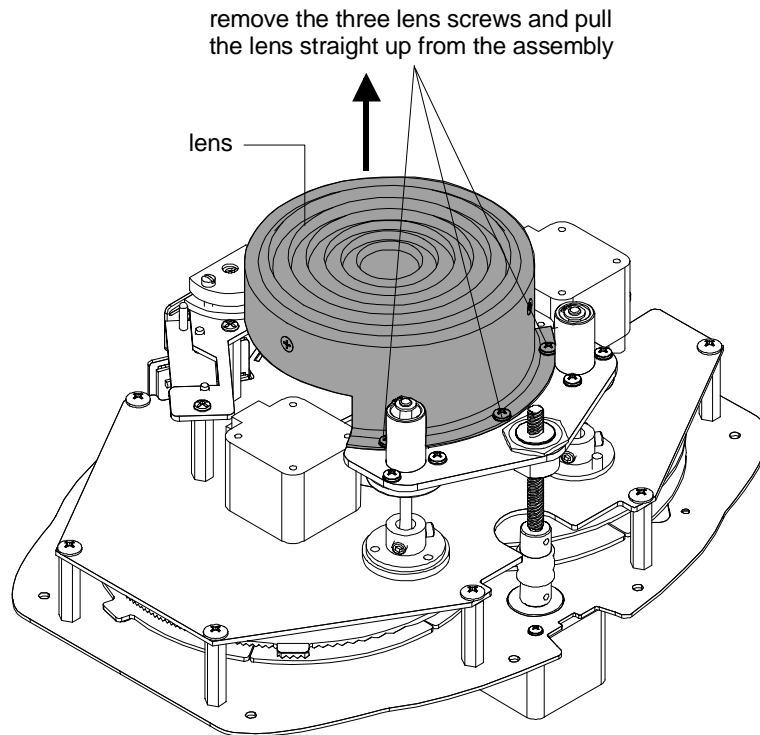
lens

Figure 7-22. Remove the screws that secure the lens to the lens assembly.

4. Place the new lens in the assembly.

Note: Before installing the new lens, you may need to clean it by using a soft, lint-free cotton cloth and a mild glass cleaning solution (*containing no ammonia*).

5. Replace and tighten the three #2 Phillips-head lens screws that secure the lens to the lens assembly.

6. Replace the bezel and engage the bezel latches.

Optimizing the Lamp

You should optimize the lamp after you replace the lamp, or if you notice a "hot spot" of brightness anywhere other than the center of the light beam.

To complete the optimization procedure below, you can use either the fixture's on-board menu system or your DMX controller.

1. Orient the fixture so that the beam will project onto a flat, white surface at least 10 feet (3 m) away.
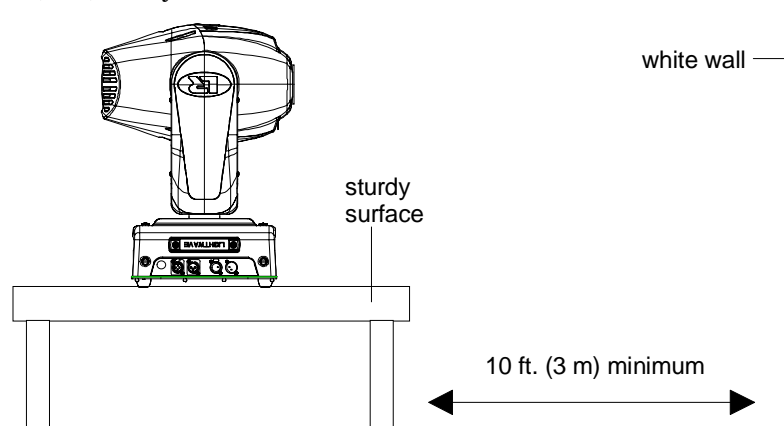
Figure 7-23. Orient the fixture for lamp optimization.

2. Turn the lamp on (see "Turning the Lamp On or Off (LAMP)" on page 4-30).

3. Make sure that the light beam is round and not oval.

    If necessary, adjust the pan and tilt construct values until the beam is round (see "Selecting a Pan Value (PAN)" on page 5-4 and "Selecting a Tilt Value (TILT)" on page 5-4).

4. For Studio Spot 250 fixtures, adjust the focus until the edge of the light beam is sharp (see "Selecting the Focus Value (FCUS)" on page 5-7).

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5. Locate the two lamp optimization screws (see Figure 7-24).

6. Loosen the two lamp optimization screws.

7. Look at the wall where the beam is projected and use the two optimization screws to adjust the lamp's position within the fixture.

lamp optimization screws

Figure 7-24. Lamp optimization screws.

8. When the beam is at its maximum brightness and the light level is even across the beam (or the "hot spot" of brightness is at the center of the beam), retighten the two optimization screws to secure the lamp in its new position.

Cleaning the Glass Components

If the glass components of your fixture become dirty, clean them by following the procedure below.

Warnings: **Disconnect power before servicing.**

Equipment surfaces may reach temperatures up to 130° C (266° F). Allow the fixture to cool before handling.

You will need:

- a soft, lint-free cotton cloth
- mild glass cleaning solution (containing no ammonia)

To clean the internal components:

1. Electrically isolate the fixture. If the fixture has been operating, allow the fixture to cool before handling.

2. Remove the bezel by unlatching the two bezel latches.

3. Clean the dichroics, lithos, effects, color wheels, and lens using a mild glass cleaner (*containing no ammonia)* and a soft, lint-free cotton cloth.

   For information on how to access the Studio Spot 250 wheels, see "Replacing Studio Spot™ 250 Wheel Components" on page 7-7. For information on how to access the Studio Color 250 wheels, see "Replacing a Studio Color® 250 Wheel" on page 7-13. For information on how to access the lens, see "Replacing the Lens" on page 7-16.

Chapter 8
Troubleshooting

This chapter lists typical symptoms and solutions for problems you might experience when using your Studio Spot 250 or Studio Color 250 fixture. If you need additional help, or if the problem you are experiencing is not listed in this chapter, contact High End Systems customer service in one of the ways shown in the section titled "Contacting High End Systems" on page ii.

⚠ **Caution: This fixture must be serviced by qualified personnel. The information listed in this section is intended to assist qualified personnel only.**

LED Display Error Messages

The Studio Spot 250 or Studio Color 250 menu system provides a comprehensive listing of error messages when problems occur. If the solution listed in Table 8-1 does not solve the problem, contact High End Systems customer service (see "Contacting High End Systems" on page ii).

Table 8-1. LED Error Messages

Display Message	Problem	Solution
ADDR LOST	The fixture was unable to retrieve the unique DMX start channel / fixture address. This error message may be received if you change the fixture type (SPOT or COLR) and cause the fixture's DMX channel range to overlap another fixture's channel range.	Set the starting channel / fixture number again (see "Address Menu (ADDR)" on page 4-20) or contact High End Systems customer service (see "Contacting High End Systems" on page ii).
ADDR OVER	A new logic board (without a stored address) was installed in the fixture or the memory location has not been initialized.	Verify the starting channel or fixture number (see "Assigning a Fixture Address" on page 2-3).

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Table 8-1. LED Error Messages

Display Message	Problem	Solution
BOOT DIFF ERR	The current boot code does not match the new boot code. This error may occur after you upload new software.	Update the boot code (see "Copying the Boot Code (BOOT)" on page 4-31).
COOL	The lamp is too hot to strike.	The fixture will automatically restrike the lamp when it has sufficiently cooled.
EMEM ACK	During data storage, an attempted write has taken too long and caused an EEPROM error.	Contact High End Systems customer service (see "Contacting High End Systems" on page ii).
EMEM [message]	The fixture experienced a memory failure and was unable to retrieve one of the following construct values: CHNL, DSPL, FHRS, LENS, LHRS, L/ST, MODE, TYPE, P/IN, T/IN, SWAP, TIME.	An electrical event may have interrupted or corrupted data for the listed construct. Try manually entering the construct value or contact High End Systems customer service (see "Contacting High End Systems" on page ii).
ERSE FLSH	During a crossload, erasing the memory has taken too long due to a bad comm board or a bad data bus.	Contact High End Systems customer service (see "Contacting High End Systems" on page ii).
FMEM ERR	Read/write error from Flash ROM.	Contact High End Systems customer service (see "Contacting High End Systems" on page ii).
HEAD TEMP ERR	• The internal temperature of the fixture's head is too high.	• Make sure the fixture's fan is working by placing your hand over the fan's exhaust located on the back of the fixture's head. If you do not feel air movement, the fan has failed. Contact High End Systems customer service (see "Contacting High End Systems" on page ii). • Remove any object which may be obstructing the fan vents on the back of the fixture's head. • Check and reduce ambient temperature by turning on fans and/or moving the fixture if it is close to a heat source.
ID LOST or ID ERR	The fixture was unable to retrieve the unique DMX start channel / fixture address.	Contact High End Systems customer service (see "Contacting High End Systems" on page ii).
LAMP OUT	• Failed lamp. • Lamp power supply failure. • The fixture lost track of the lamp status during an electrical event.	• Replace lamp (see "Replacing the Lamp" on page 7-4). • Allow the fixture 5 to 10 minutes to cool, then attempt to strike the lamp (see "Turning the Lamp On or Off (LAMP)" on page 4-30). • Contact High End Systems customer service (see "Contacting High End Systems" on page ii).

Table 8-1. LED Error Messages

Display Message	Problem	Solution
LAMP TOUT ERR	• Lamp is too hot to restrike. • Failed lamp. • Ignitor failure.	• Allow 5 to 10 minutes for the lamp to cool, and attempt to restrike the lamp (see "Turning the Lamp On or Off (LAMP)" on page 4-30). • Replace the lamp (see "Replacing the Lamp" on page 7-4). • Contact High End Systems customer service (see "Contacting High End Systems" on page ii).
LINK BUSY	• Controller or other crossloading fixture is communicating on the link. • Serial data distributor, optoisolator, controller, or fixture using RS-422 communication is located *before* Studio Spot 250 or Studio Color 250 fixtures on the link. • Preset playback is on, and the master fixture detected other activity on the link and stopped transmitting time code.	• Disconnect controller or wait for other crossloading fixture to finish crossloading. • Remove or bypass the offending device(s) on the data link and reattempt the crossload. • Verify that no other fixture is assigned DMX start channel 1 or fixture number 1 except the master fixture. • Three minutes after the last activity on the link was detected, the master fixture will attempt to resend the time code.
LINK EMTY or LINK ERR	The crossloading fixture experienced a communication failure with other fixtures due to: • Bad cable(s). • No data or bad data. • Output from previous fixture was bad. • Bad comm board.	• Test and replace cable(s) as necessary. • Test controller data on another link. • Test by bypassing previous fixture on the link. • Contact High End Systems customer service (see "Contacting High End Systems" on page ii).
OVER	Lamp strikes, lamp hours, or fixture hours have exceeded the limited range of 9999.	Reset the menu item that has rolled out of range (see "Resetting Lamp Hours (L/RS)" on page 4-39, or "Resetting Fixture Hours (F/RS)" on page 4-38).
PCB TEMP ERR	• The internal temperature of the fixture's logic board is too high.	• Make sure the fixture's fan is working by placing your hand over the fan's exhaust located on the rear panel. If you do not feel air movement, the fan has failed. Contact High End Systems customer service (see "Contacting High End Systems" on page ii). • Remove any object which may be obstructing the fan vents on the back of the rear panel. • Check and reduce ambient temperature by turning on fans and/or moving the fixture if it is close to a heat source.

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Table 8-1. LED Error Messages

Display Message	Problem	Solution
PAN DRV ERR	• The pan motor wire has shorted to ground. • Bad pan driver chip.	Contact High End Systems customer service (see "Contacting High End Systems" on page ii).
PAN ENCD	• The pan encoder sensor is not connected. • The pan encoder is not functioning properly.	Contact High End Systems customer service (see "Contacting High End Systems" on page ii).
PAN ERR	• Loose pan pinion gear. • Loose pan motor cable. • Incorrect cabling to pan input. • Bad pan sensor. • Bad pan motor.	Contact High End Systems customer service (see "Contacting High End Systems" on page ii).
PAN STOP	• There is a physical obstruction blocking pan movement. • The pan encoder is out of calibration.	Contact High End Systems customer service (see "Contacting High End Systems" on page ii).
PRGM TIME	The maximum allowed programming time was exceeded during an upload due to: • Incomplete data. • Bad board.	• Try the upload again (see "Uploading Software to the Fixture" on page 3-15). • Contact High End Systems customer service (see "Contacting High End Systems" on page ii).
PRST LOST	Preset scenes stored on the fixture's on-board memory were lost.	An electrical event may have interrupted or corrupted preset scene data. Try manually entering the preset scene or contact High End Systems customer service (see "Contacting High End Systems" on page ii)
SENS ERR	Problem with the tab, sensor or motor on the specified sensor.	• Run a self-test on the specified sensor (see "Performing Self Tests (SELF)" on page 4-31). • Contact High End Systems customer service (see "Contacting High End Systems" on page ii).
SVCC ERR	There was a sensor error due to: • Bad board • Loose cable	Contact High End Systems customer service (see "Contacting High End Systems" on page ii).
THRM CHIP	The microprocessor maximum temperature was exceeded.	• Move the fixture if it is close to a heat source. • Remove any object which may be obstructing the fixture's heatsink. • Check and reduce ambient temperature by turning on fans, etc.

Table 8-1. LED Error Messages

Display Message	Problem	Solution
THRM PAN	The pan motor maximum temperature was exceeded.	• Move the fixture if it is close to a heat source. • Remove any object which may be obstructing the fixture's heatsink. • Check and reduce ambient temperature by turning on fans, etc.
THRM TILT	The tilt motor maximum temperature was exceeded.	• Move the fixture if it is too close to a heat source. • Remove any object which may be obstructing the fixture's heatsink. • Check and reduce ambient temperature by turning on fans, etc.
TILT CONN	The tilt sensor is not connected	Contact High End Systems customer service (see "Contacting High End Systems" on page ii).
TILT DRV ERR	• The tilt motor wire has shorted to ground. • Bad tilt driver chip.	Contact High End Systems customer service (see "Contacting High End Systems" on page ii).
TILT ENCD	The tilt encoder is not connected or not functioning properly.	Contact High End Systems customer service (see "Contacting High End Systems" on page ii).
TILT ERR	• Loose tilt pinion gear. • Loose tilt motor cable. • Incorrect cabling to tilt input. • Bad tilt sensor. • Bad tilt motor.	Contact High End Systems customer service (see "Contacting High End Systems" on page ii).
TILT STOP	• There is a physical obstruction blocking the tilt movement. • The tilt encoder is out of calibration.	Remove the obstruction and home the fixture.
UPLD	The fixture is held in boot mode because power was disconnected during an upload.	Reconnect the fixture and perform the upload again or contact High End Systems customer service (see "Contacting High End Systems" on page ii)

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Status LEDs

The status LEDs help determine where any problems with your Studio Spot 250 or Studio Color 250 fixture may be originating. See Table 8-2 for a description of the five status LEDs.

Table 8-2. Status LEDs

LED	State	Problem Indication?	Description
Motor	solid green	No	The motor power supply is receiving adequate voltage.
	OFF	Yes	Fuse or power failure.
Lamp	solid yellow	No	The lamp power supply is receiving the proper voltage, and the lamp is ON.
	OFF	Not necessarily*	The lamp is extinguished.
	flashing	Yes	The fixture is unable to strike the lamp.
5V	solid red	No	The logic board is receiving the required voltage.
	OFF	Yes	Fuse or power failure.
Transmit	solid yellow	No	Fixture is crossloading software to other fixtures on the link.
	OFF	Not necessarily**	No DMX 512 data is being transmitted.
	flashing	No	The fixture is in preset playback mode, and is the master fixture.
Receive	solid green	No	The fixture is receiving new software from a crossload or upload.
	OFF	Not necessarily**	No DMX 512 data is being received.

*Note: If you shut down the lamp using a remote shutdown command, the lamp and the Lamp LED will shut off. However, if you have bad data cables, no data cables/controller connected to the fixture, or the controller is off, the lamp and its LED will also be off. If correcting these problems does not turn the lamp ON, see the next section.

**Note: Neither the Transmit nor the Receive LED will be ON until you have connected the fixture to a DMX 512-compatible controller using XLR data-grade cabling. If these LEDs remain OFF even though you have connected the fixture to a controller and are sending DMX 512 commands to the fixture, see the next section.

General Troubleshooting

To find solutions to general fixture problems not indicated by alphanumeric LED display error messages or status LEDs, see Table 8-3.

Table 8-3. General Troubleshooting

Problem	Probable Cause	Solution
Fixture will not turn on.	• No power is connected. • Breaker is turned off. • Power connectors are bad.	• Connect power to the fixture. • Turn the breaker on. • Contact High End Systems customer service (see "Contacting High End Systems" on page ii).
Fixture functions but lamp does not strike.	• The lamp is bad. • The voltage setting is incorrect. • The lamp is currently too hot to strike. • The Ignitor connection is loose.	• Replace the lamp (see "Replacing the Lamp" on page 7-4). • Provide correct power source voltage, power cord cap, and input voltage setting (see "Changing the Power Cord Cap" on page 1-5, or "Setting the Fixture Voltage" on page 1-2). • Allow the lamp to cool, then restrike the lamp (see "Turning the Lamp On or Off (LAMP)" on page 4-30). • Contact High End Systems customer service (see "Contacting High End Systems" on page ii).
Lamp is dimmer than other fixtures.	• The lamp is bad. • The voltage setting is incorrect. • The wrong type of lamp is installed. • The lamp is not optimized.	• Replace lamp with the specified type (see "Replacing the Lamp" on page 7-4). • Provide correct power source voltage or change input voltage setting (see "Setting the Fixture Voltage" on page 1-2). • Optimize the lamp (see "Optimizing the Lamp" on page 7-19).
LAMP shuts off during operation.	• The lamp is bad. • The lamp has exceeded the maximum temperature. • The lamp socket is loose and causing arcing.	• Replace the lamp (see"Replacing the Lamp" on page 7-4). • Allow the fixture 5 to 10 minutes to cool, then attempt to strike the lamp (see "Turning the Lamp On or Off (LAMP)" on page 4-30). • Contact High End Systems customer service (see "Contacting High End Systems" on page ii).

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Table 8-3. General Troubleshooting

Problem	Probable Cause	Solution
Fixture will not home properly.	A sensor, driver, or motor is faulty.	Contact High End Systems customer service (see "Contacting High End Systems" on page ii)
Color system is not producing the correct color.	The fixture is not properly homed.	• Home the fixture (see "Control" on page 3-14 or "Homing the Fixture (HOME)" on page 4-30). • Contact High End Systems Customer Service (see "Contacting High End Systems" on page ii).
Fixture is not responding to controller commands or is producing unexpected results.	• The data cable is faulty. • No controller is attached to the link or the controller is not generating any output. • The fixture has an incorrect fixture number or DMX start channel. • The link was not terminated.	• Test and replace the data cables as necessary. • Verify that a controller is connected to the link and is generating output by sending commands to a known working device. • Verify the fixture number or DMX start channel does not overlap another fixture's DMX start channel or fixture number (see "Assigning a Fixture Address" on page 2-3). • Terminate the link (see "Constructing a Terminator" on page 1-11).
Pan or Tilt position is off.	The pan and tilt is out of home.	• Home the fixture (see "Control" on page 3-14 or "Homing the Fixture (HOME)" on page 4-30). • Contact High End Systems customer service (see "Contacting High End Systems" on page ii).
Display is not functioning.	• The LED display is set off. • The power supply fuse is bad. • The power connectors are loose. • The software upload was incomplete. • The logic board is bad.	• Turn the LED display on (see "Changing the Display Output (DSPL)" on page 4-23). • Check the power supply fuses (see "Replacing Fuses" on page 7-1). • At fixture start-up, press the two navigational arrow buttons simultaneously. The LED will display "UPLD" and hold the fixture in boot mode. Reload the latest version of the software. • Contact High End Systems customer service (see "Contacting High End Systems" on page ii).

Table 8-3. General Troubleshooting

Problem	Probable Cause	Solution
Dichroic or litho is not centered in the beam or is in the wrong position.	• The wheel has lost position. • The dichroic or litho does not meet High End Systems specifications.	• Home the fixture (see "Control" on page 3-14 or "Homing the Fixture (HOME)" on page 4-30). You should home the fixture *immediately* if you notice that the litho wheel has lost position (i.e. stuck between two patterns). If the litho wheel is not correctly aligned in the optical path, the wheel could be damaged. • Replace the dichroic or litho with one that meets the specifications listed in the section titled "Dichroic, Litho, and Effect Specifications" on page intro-7.
Dichroics or lithos in Studio Spot 250 are cracking	• The dichroic or litho was improperly installed. • The dichroic or litho does not meet High End Specifications. • A faulty hot mirror allowing overheating inside the fixture.	• Verify the dichroic or litho is correctly installed (see "Replacing Studio Spot™ 250 Wheel Components" on page 7-7). • Replace the dichroic or litho with one that meets the specifications listed in the section titled "Dichroic, Litho, and Effect Specifications" on page intro-7. • Contact High End Systems customer service (see "Contacting High End Systems" on page ii).
Light output is low and/or fuzzy.	The optical path is dirty.	Clean the internal glass components (see "Cleaning the Glass Components" on page 7-20).

Upload and Crossload Troubleshooting

To find solutions to problems encountered while uploading or crossloading new software versions, see Table 8-4.

Table 8-4. Upload and Crossload Troubleshooting

Problem	Probable Cause	Solution
Not all fixtures on the link are receiving the upload.	• Fixture(s) are OFF • Bad cable(s) • Cable(s) disconnected	• Turn Fixture(s) on • Test and replace cable(s) as necessary • Reconnect cable(s)

Table 8-4. Upload and Crossload Troubleshooting

Problem	Probable Cause	Solution
Status Cue Lighting Console displays "Fixture could not erase Flash ROM."	• The XLR cable(s) disconnected • Bad cable(s) • The fixture's electrical circuitry is damaged	• Reconnect XLR cable(s) • Replace cable(s)
Status Cue Lighting Console displays "Warning: No response from Fixture xx (Link xx Address xx)."	• Status Cue was configured with a fixture at that address, but no fixtures were found there. • Controllers, serial data distributors, data line Optoisolators, or fixture(s) using RS-422 communication is connected *before* Studio Spot 250 or Studio Color 250 fixtures on the link.	• If there is not a fixture at that address, ignore this message - if there is a fixture at that address, verify the fixture number/ DMX start channel. • Check connections • Check to ensure fixture is turned ON. • Remove or bypass the offending devices from the data link or move them *after* the Studio Spot 250 or Studio Color 250 fixtures.
The fixture's LED displays: BOOT DIFF ERR	New software included a new boot code.	Accept and store the new boot code (see "Copying the Boot Code (BOOT)" on page 4-31).
Fixtures are not crossloading.	Controllers, serial data distributors, data line Optoisolators, or fixture(s) using RS-422 communication is connected *before* Studio Spot 250 or Studio Color 250 fixtures on the link.	Remove or bypass any offending devices from the data link or move them *after* the Studio Spot 250 or Studio Color 250 fixtures.

Laser Aiming Device (LAD™) Troubleshooting

Table 8-5. LAD Troubleshooting

Problem	Probable Cause	Solution
The laser gradually loses power.	Over time, the laser will lose power until it dims out entirely.	Contact High End Systems customer service to replace the LAD (see "Contacting High End Systems" on page ii).
The laser is out of alignment.		Realign the laser (see "Aligning the Laser" on page 6-3).
The emission indicator LED is off and the laser is off.	The laser circuit board is not receiving power.	Remove the fixture's bezel and verify that the cable labeled "LAD" is connected to the fixture's circuit board. Replace the bezel and use your DMX controller or the fixture's menu systems to access the laser. If the LED and laser are still not functioning, contact High End Systems customer service (see "Contacting High End Systems" on page ii).
The emission indicator LED is on, but the laser is off.	The LAD is not receiving power.	Remove the fixture's bezel and verify that the cable labeled "LAD" is connected to the fixture's circuit board. Replace the bezel and use your DMX controller or the fixture's menu systems to access the laser. If the LED and laser are still not functioning, contact High End Systems customer service (see "Contacting High End Systems" on page ii).
The laser is on, but the emission indicator LED is off.	The emission indicator LED is faulty.	Contact High End Systems customer service to replace the emission indicator LED (see "Contacting High End Systems" on page ii).

8

Appendix A
DMX Control

This appendix includes tables which lists the appropriate DMX start channels, construct parameters for Studio Spot 250 and Studio Color 250 fixtures, and MSpeed time conversions.

DMX Start Channels

Table A-1 lists the DMX start channels for Studio Spot 250 and Studio Color 250 fixtures. This table assumes that the fixtures are all assigned to the same link, one after another, and that all fixtures use the *same number of channels* (i.e. only Studio Spot 250 fixtures (or other devices using 18 DMX channels) on the link, or only Studio Color 250 fixtures (or other devices using 15 DMX channels) on the link).

Table A-1. DMX Start Channels

Fixture Order in the Link	Studio Spot 250 DMX Start Channels	Studio Color 250 DMX Start Channels
1	1	1
2	19	16
3	37	31
4	55	46
5	73	61
6	91	76
7	109	91
8	127	106
9	145	121
10	163	136
11	181	151
12	199	166
13	217	181
14	235	196
15	253	211
16	271	226
17	289	241
18	307	256
19	325	271
20	343	286

Table A-1. DMX Start Channels

Fixture Order in the Link	Studio Spot 250 DMX Start Channels	Studio Color 250 DMX Start Channels
21	361	301
22	379	316
23	397	331
24	415	346
25	433	361
26	451	376
27	469	391
28	487*	406
29		421
30		436
31		451
32		466
33		481**
34		496**

*Note: Up to 28 Studio Spot 250 fixtures can be connected to one link. Channels 505 - 512 cannot be used due to Studio Spot 250's 18-channel range.

**Note: Although there are enough available DMX channels to link up to 34 Studio Color 250 fixtures, you must use a DMX splitter to connect more than 32 fixtures per link. The 32 device limit complies with the EIA-485 standard. Connecting more than 32 devices per link without a DMX splitter will eventually deteriorate the digital signal.

Construct Parameters

Construct parameters (also referred to as DMX protocol) are the specific controller values for each construct available on the fixture. For more information on the available fixture constructs, see "Fixture Constructs" on page 3-2.

Studio Spot™ 250 Construct Parameters

Table A-2 lists the 18 Studio Spot 250 constructs and their corresponding DMX controller values. If you have a numeric-type controller, use the Value Decimal (dec.) column. If you have a fader-type controller, use the Value Percentage (%) column. If your controller allows you to program hex values, use the Value (hex) column.

The values in the Value Percentage (%) column may vary slightly depending on your controller's rounding convention.

Table A-2. Studio Spot™ 250 Construct Parameters

Channel	Construct	Description	Value (dec.)	Value (%)	Value (hex)
1	Pan	Pan Coarse	0 - 255	0-100	0-FF
2	Pan	Pan Fine	0 - 255	0-100	0-FF
3	Tilt	Tilt Coarse	0 - 255	0-100	0-FF
4	Tilt	Tilt Fine	0 - 255	0-100	0-FF
5	Color Function	*Full Speed Control*			
		Indexed	0 - 15	0-6	0-0F
		Forward Spin	16-31	6-12	10-1F
		Reverse Spin	32-47	13-18	20-2F
		Continuous	48-63	19-25	30-3F
		Slow Scan	64-79	25-31	40-4F
		Fast Scan	80-95	31-37	50-5F
		Random	96-111	38-44	60-6F
		Blink-Indexed	112-127	44-50	70-7F
		MSpeed Control			
		Indexed	128-143	50-56	80-8F
		Forward Spin	144-159	57-62	90-9F
		Reverse Spin	160-175	63-69	A0-AF
		Continuous	176-191	69-75	B0-BF
		Slow Scan	192-207	75-81	C0-CF
		Fast Scan	208-223	82-88	D0-DF
		Random	224-239	88-94	E0-EF
		Blink-Indexed	240-255	94-100	F0-FF
6	Color Wheel Position	*Indexed Mode*			
		Color 1	0-23	0-9	0-17
		Color 2	24-31	9-12	18-1F
		Color 3	32-39	13-15	20-27
		Color 4	40-47	16-18	28-2F
		Color 5	48-55	19-22	30-37
		Color 6	56-63	22-25	38-3F
		Color 7	64-71	25-28	40-47
		Color 8	72-79	28-31	48-4F
		Color 9	80-87	31-34	50-57
		Color 10	88-95	35-37	58-5F
		Color 11	96-103	38-40	60-67
		Color 12	104-111	41-44	68-6F

Table A-2. Studio Spot™ 250 Construct Parameters

Channel	Construct	Description	Value (dec.)	Value (%)	Value (hex)
		Color 13	112-127	44-50	70-7F
		Color 1/2	128-143	50-56	80-8F
		Color 2/3	144-151	57-59	90-97
		Color 3/4	152-159	60-62	98-9F
		Color 4/5	160-167	63-66	A0-A7
		Color 5/6	168-175	66-69	A8-AF
		Color 6/7	176-183	69-72	B0-B7
		Color 7/8	184-191	72-75	B8-BF
		Color 8/9	192-199	75-78	C0-C7
		Color 9/10	200-207	78-81	C8-CF
		Color 10/11	208-215	82-84	D0-D7
		Color 11/12	216-223	85-88	D8-DF
		Color 12/13	224-231	88-91	E0-E7
		Color 13/1	232-247	91-97	E8-F7
		Color 1	248-255	97-100	F8-FF
		Continuously Variable Mode			
		Color 1	0	0	0
		Color 2	19	8	13
		Color 3	39	15	27
6 (cont.)	Color Wheel Position (cont.)	Color 4	58	23	3A
		Color 5	78	31	4E
		Color 6	98	38	62
		Color 7	117	46	75
		Color 8	137	54	89
		Color 9	156	61	9C
		Color 10	176	69	B0
		Color 11	196	77	C4
		Color 12	215	84	D7
		Color 13	235	92	EB
		Color 1	255	100	FF
		Continuously Variable Forward Spin Mode			
		Spin Stop	0-3	0-1	0-3
		Spin Forward Slowest	4	2	4
		Spin Forward Fastest	255	100	FF
		Continuously Variable Reverse Spin Mode			
		Spin Stop	0-3	0-1	0-3

Table A-2. Studio Spot™ 250 Construct Parameters

Channel	Construct	Description	Value (dec.)	Value (%)	Value (hex)
6 (cont.)	Color Wheel Position (cont.)	Spin Reverse Slowest	4	2	4
		Spin Reverse Fastest	255	100	FF
		Random Mode			
		Random Stop	0-3	0-1	0-3
		Random Slowest	4	2	4
		Random Fastest	255	100	FF
7	Litho Function	*Full Speed Control*			
		Indexed	0-15	0-6	0-0F
		Forward Rotate	16-31	6-12	10-1F
		Reverse Rotate	32-47	13-18	20-2F
		Wheel Spin	48-63	19-25	30-3F
		Scanning	64-79	25-31	40-4F
		Random	80-95	31-37	50-5F
		Blink Wheel	96-111	38-44	60-6F
		Blink Aperture	112-127	44-50	70-7F
		MSpeed Control			
		Indexed	128-143	50-56	80-8F
		Forward Rotate	144-159	57-62	90-9F
		Reverse Rotate	160-175	63-69	A0-AF
		Wheel Spin	176-191	69-75	B0-BF
		Scanning	192-207	75-81	C0-CF
		Random	208-223	82-88	D0-DF
		Blink Wheel	224-239	88-94	E0-EF
		Blink Aperture	240-255	94-100	F0-FF
8	Litho Position	*Indexed Mode*			
		Position 0	0-15	0-6	0-0F
		Position 1	16-47	6-18	10-2F
		Position 2	48-79	19-31	30-4F
		Position 3	80-111	31-44	50-6F
		Position 4	112-143	44-56	70-8F
		Position 5	144-175	57-69	90-AF
		Position 6	176-207	69-81	B0-CF
		Position 7	208-239	82-94	D0-EF
		Position 0	240-255	94-100	F0-FF
9	Litho Rotate	*Indexed Mode*			
		Position	0-255	0-100	0-FF
		Continuously Variable Forward Rotate Mode			
		Rotate Stop	0-3	0-1	0-3

Table A-2. Studio Spot™ 250 Construct Parameters

Channel	Construct	Description	Value (dec.)	Value (%)	Value (hex)
9 (cont.)	Litho Rotate (cont.)	Rotate Forward Slowest	4	2	4
		Rotate Forward Fastest	255	100	FF
		Continuously Variable Reverse Rotate Mode			
		Rotate Stop	0-3	0-1	0-3
		Rotate Reverse Slowest	4	2	4
		Rotate Reverse Fastest	255	100	FF
		Scan Mode			
		Slowest Scanning	0	0	0
		Fastest Scanning	255	100	FF
		Random Mode			
		Random Stop	0-3	0-1	0-3
		Random Slowest	4	2	4
		Random Fastest	255	100	FF
		Continuously Variable Wheel Spin Mode			
		Fastest Reverse Spin	0	0	0
		Slowest Reverse Spin	127	50	7F
		Slowest Forward Spin	128	50	80
		Fastest Forward Spin	255	100	FF
10	Effects Wheel	*Full Speed Control*			
		Position 0	0-25	0-10	0-19
		Position 1	26-51	10-20	1A-33
		Position 2	52-76	20-30	34-4C
		Position 3	77-102	30-40	4D-66
		Position 4	103-127	40-50	67-7F
		MSpeed Control			
		Position 0	128-153	50-60	80-99
		Position 1	154-178	60-70	9A-B2
		Position 2	179-204	70-80	B3-CC
		Position 3	205-229	80-90	CD-E5
		Position 4	230-255	90-100	E6-FF
11	Effects Rotate	Fastest Reverse Rotate	0	0	0
		Slowest Reverse Rotate	120	47	78
		Rotate Stop	121-134	48-53	79-86
		Slowest Forward Rotate	135	53	87
		Fastest Forward Rotate	255	100	FF
12	Focus	Focus In	0	0	0
		Focus Out	255	100	FF

Table A-2. Studio Spot™ 250 Construct Parameters

Channel	Construct	Description	Value (dec.)	Value (%)	Value (hex)
13	Iris	Close	0	0	0
		Variable Iris	1-127	1-50	01-7F
		Open	128-135	50-53	80-87
		Periodic Strobe (Variable)	136-151	53-59	88-97
		Random Strobe (Variable)	152-167	60-66	98-A7
		Ramp Open/Snap Shut (Variable)	168-183	66-72	A8-B7
		Snap Open/Ramp Shut (Variable)	184-199	72-78	B8-C7
		Ramp Open/Ramp Shut (Variable)	200-215	78-84	C8-D7
		Random Ramp/Snap (Variable)	216-231	85-91	D8-E7
		Random Snap/Ramp (Variable)	232-247	91-97	E8-F7
		Open	248-255	97-100	F8-FF
14	Shutter	Close	0-23	0-9	0-17
		Periodic Strobe (Variable)	24-49	9-19	18-31
		Random/Rand Strobe (Variable)	50-75	20-29	32-4B
		Random/Sync (Variable)	76-101	30-40	4C-65
		Ramp Open/Snap Shut (Variable)	102-127	40-50	66-7F
		Snap Open/Ramp Shut (Variable)	128-153	50-60	80-99
		Ramp Open/Ramp Shut (Variable)	154-179	60-70	9A-B3
		Random Ramp/Snap (Variable)	180-205	71-80	B4-CD
		Random Snap/Ramp (Variable)	206-231	81-91	CE-E7
		Open	232-255	91-100	E8-FF
15	Dim	Close	0	0	0
		Open	255	100	FF
16	MSpeed *(see Table A-4 on page A-14)*	Disable	0-3	0-1	0-3
		Longest (252.7 sec.)	4	2	4
		Shortest (0.15 sec.)	255	100	FF
17	Macro/LAD	No Macro / LAD off	0-7	0-3	0-07
		Macro 1	8-11	3-4	08-0B
		Macro 2	12-15	5-6	0C-0F
		Macro 3	16-19	6-8	10-13
		Macro 4	20-23	8-9	14-17
		Macro 5	24-27	9-11	18-1B
		Macro 6	28-31	11-12	1C-1F
		Macro 7	32-35	13-14	20-23
		Macro 8	36-39	14-15	24-27
		Macro 9	40-43	16-17	28-2B
		Macro 10	44-47	17-18	2C-2F
		Macro 11	48-51	19-20	30-33
		Macro 12	52-55	20-22	34-37

Table A-2. Studio Spot™ 250 Construct Parameters

Channel	Construct	Description	Value (dec.)	Value (%)	Value (hex)
17 (cont.)	Macro/LAD (cont.)	Macro 13	56-59	22-23	38-3B
		Macro 14	60-63	24-25	3C-3F
		Macro 15	64-67	25-26	40-43
		Macro 16	68-71	27-28	44-47
		Macro 17	72-75	28-29	48-4B
		Macro 18	76-79	30-31	4C-4F
		Macro 19	80-83	31-33	50-53
		Macro 20	84-87	33-34	54-57
		Macro 21	88-91	35-36	58-5B
		Macro 22	92-95	36-37	5C-5F
		Macro 23	96-99	38-39	60-63
		Macro 24	100-103	39-40	64-67
		Macro 25	104-107	41-42	68-6B
		Macro 26	108-111	42-44	6C-6F
		Macro 27	112-115	44-45	70-73
		Macro 28	116-119	46-47	74-77
		Macro 29	120-123	47-48	78-7B
		Macro 30	124-127	49-50	7C-7F
		Macro 31	128-131	50-51	80-83
		Macro 32	132-135	52-53	84-87
		Random Macros (Variable)	136-167	53-66	88-A7
		LAD Off / No Macros	168-199	66-78	A8-C7
		LAD Modulate (Variable)	200-231	78-91	C8-E7
		LAD On	232-255	91-100	E8-FF
18	Control *(After choosing a control channel value, set the Shutter channel to "O" to access the Control channel settings)*	Safe (normal operation)	0-9	0-4	0-9
		Pan & Tilt MSpeed Off	10-19	4-8	0A-13
		Display Off	20-28	8-11	14-1C
		Display Dim	30-38	12-15	1E-26
		Display Bright	40-48	16-19	28-30
		Home	60-68	24-27	3C-44
		Lamp On	80-88	31-35	50-58
		Lamp Off	90-98	35-38	5A-62
		Shutdown *(send this value for approximately two seconds)*	120-130	47-51	78-82

Studio Color® 250 Construct Parameters

Table A-3 lists the 15 Studio Color 250 constructs and their corresponding DMX controller values. If you have a numeric-type controller, use the Value Decimal (dec.) column. If you have a fader-type controller, use the Value Percentage (%) column. If your controller allows you to program hex values, use the Value (hex) column.

The values in Table A-3 may vary slightly depending on your controller's rounding convention.

Table A-3. Studio Color® 250 Construct Parameters

Channel	Construct	Description	Value (dec.)	Value (%)	Value (hex)
1	Pan	Pan Coarse	0 - 255	0-100	0-FF
2	Pan	Pan Fine	0 - 255	0-100	0-FF
3	Tilt	Tilt Coarse	0 - 255	0-100	0-FF
4	Tilt	Tilt Fine	0 - 255	0-100	0-FF
5	Color Function	*Full Speed Control*			
		Continuous	0 - 15	0-6	0-0F
		Indexed	16-31	6-12	10-1F
		Pure Mix	32-47	13-18	20-2F
		Spin	48-63	19-25	30-3F
		Cycle	64-79	25-31	40-4F
		Not Assigned - To Be Determined	80-95	31-37	50-5F
		Random	96-111	38-44	60-6F
		Blink-Indexed	112-127	44-50	70-7F
		MSpeed Control			
		Continuous	128-143	50-56	80-8F
		Indexed	144-159	57-62	90-9F
		Pure Mix	160-175	63-69	A0-AF
		Spin	176-191	69-75	B0-BF
		Cycle	192-207	75-81	C0-CF
		Not Assigned - To Be Determined	208-223	82-88	D0-DF
		Random	224-239	88-94	E0-EF
		Blink-Indexed	240-255	94-100	F0-FF
6	Cyan Color Wheel	*Continuous Mode*			
		Open	0	0	0
		Color 1	42	17	2A
		Color 2	85	33	55
		Cyan In (Full saturation)	127	50	7F
		Cyan Out (Low saturation)	255	100	FF
		Indexed Mode			

Table A-3. Studio Color® 250 Construct Parameters

Channel	Construct	Description	Value (dec.)	Value (%)	Value (hex)
6 (cont.)	Cyan Color Wheel (cont.)	Open	0-15	0-6	0-0F
		Color 1	16-47	6-18	10-2F
		Color 2	48-79	19-31	30-4F
		Cyan Full Saturation	80-111	31-44	50-6F
		Cyan Medium High Saturation	112-143	44-56	70-8F
		Cyan Medium Saturation	144-175	57-69	90-AF
		Cyan Medium Low Saturation	176-207	69-81	B0-CF
		Cyan Low Saturation	208-239	82-94	D0-EF
		Open	240-255	94-100	F0-FF
		Pure Mix Mode			
		Cyan In (Full saturation)	0	0	0
		Cyan Out (Low saturation)	255	100	FF
		Spin Mode			
		Continuous Positioning	0-127	0-50	0-7F
		Spin Reverse Fastest	128-157	50-62	80-9D
		Spin Reverse Slowest	158-187	62-73	9E-BB
		Spin Stop	188-195	74-77	BC-C3
		Spin Forward Slowest	196-225	77-88	C4-E1
		Spin Forward Fastest	226-255	89-100	E2-FF
		Cycle & Random Modes			
		Slow Rate	0	0	0
		Fast Rate	255	100	FF
7	Magenta Color Wheel	*Continuous Mode*			
		Open	0	0	0
		Color 1	42	17	2A
		Color 2	85	33	55
		Magenta In (Full saturation)	127	50	7F
		Magenta Out (Low saturation)	255	100	FF
		Indexed Mode			
		Open	0-15	0-6	0-0F
		Color 1	16-47	6-18	10-2F
		Color 2	48-79	19-31	30-4F
		Magenta Full Saturation	80-111	31-44	50-6F
		Magenta Medium High Saturation	112-143	44-56	70-8F
		Magenta Medium Saturation	144-175	57-69	90-AF
		Magenta Medium Low Saturation	176-207	69-81	B0-CF
		Magenta Low Saturation	208-239	82-94	D0-EF
		Open	240-255	94-100	F0-FF
		Pure Mix Mode			

Table A-3. Studio Color® 250 Construct Parameters

Channel	Construct	Description	Value (dec.)	Value (%)	Value (hex)
7 (cont.)	Magenta Color Wheel (cont.)	Magenta In (Full saturation)	0	0	0
		Magenta Out (Low saturation)	255	100	FF
		Spin Mode			
		Continuous Positioning	0-127	0-50	0-7F
		Spin Reverse Fastest	128-157	50-62	80-9D
		Spin Reverse Slowest	158-187	62-73	9E-BB
		Spin Stop	188-195	74-77	BC-C3
		Spin Forward Slowest	196-225	77-88	C4-E1
		Spin Forward Fastest	226-255	89-100	E2-FF
8	Yellow Color Wheel	*Continuous Mode*			
		Open	0	0	0
		Color 1	42	17	2A
		Color 2	85	33	55
		Yellow In (Full saturation)	127	50	7F
		Yellow Out (Low saturation)	255	100	FF
		Indexed Mode			
		Open	0-15	0-6	0-0F
		Color 1	16-47	6-18	10-2F
		Color 2	48-79	19-31	30-4F
		Yellow Full Saturation	80-111	31-44	50-6F
		Yellow Medium High Saturation	112-143	44-56	70-8F
		Yellow Medium Saturation	144-175	57-69	90-AF
		Yellow Medium Low Saturation	176-207	69-81	B0-CF
		Yellow Low Saturation	208-239	82-94	D0-EF
		Open	240-255	94-100	F0-FF
		Pure Mix Mode			
		Yellow In (Full saturation)	0	0	0
		Yellow Out (Low saturation)	255	100	FF
		Spin Mode			
		Continuous Positioning	0-127	0-50	0-7F
		Spin Reverse Fastest	128-157	50-62	80-9D
		Spin Reverse Slowest	158-187	62-73	9E-BB
		Spin Stop	188-195	74-77	BC-C3
		Spin Forward Slowest	196-225	77-88	C4-E1
		Spin Forward Fastest	226-255	89-100	E2-FF

Table A-3. Studio Color® 250 Construct Parameters

Channel	Construct	Description	Value (dec.)	Value (%)	Value (hex)
9	Beam Shaping (Lenticular Wheel)	Continuous Positioning	0-127	0-50	0-7F
		Spin Reverse Fastest	128-157	50-62	80-9D
		Spin Reverse Slowest	158-187	62-73	9E-BB
		Spin Stop	188-195	74-77	BC-C3
		Spin Forward Slowest	196-225	77-88	C4-E1
		Spin Forward Fastest	226-255	89-100	E2-FF
10	Focus	Focus In	0	0	0
		Focus Out	255	100	FF
11	Shutter	Close	0-23	0-9	0-17
		Periodic Strobe (Variable)	24-49	9-19	18-31
		Random/Rand Strobe (Variable)	50-75	20-29	32-4B
		Random/Sync (Variable)	76-101	30-40	4C-65
		Ramp Open/Snap Shut (Variable)	102-127	40-50	66-7F
		Snap Open/Ramp Shut (Variable)	128-153	50-60	80-99
		Ramp Open/Ramp Shut (Variable)	154-179	60-70	9A-B3
		Random Ramp/Snap (Variable)	180-205	71-80	B4-CD
		Random Snap/Ramp (Variable)	206-231	81-91	CE-E7
		Open	232-255	91-100	E8-FF
12	Dim	Close	0	0	0
		Open	255	100	FF
13	MSpeed *(see Table A-4 on page A-14)*	Disable	0-3	0-1	0-3
		Longest (252.7 sec.)	4	2	4
		Shortest (0.15 sec.)	255	100	FF
14	Macro/LAD	No Macro / LAD off	0-7	0-3	0-07
		Macro 1	8-11	3-4	08-0B
		Macro 2	12-15	5-6	0C-0F
		Macro 3	16-19	6-8	10-13
		Macro 4	20-23	8-9	14-17
		Macro 5	24-27	9-11	18-1B
		Macro 6	28-31	11-12	1C-1F
		Macro 7	32-35	13-14	20-23
		Macro 8	36-39	14-15	24-27
		Macro 9	40-43	16-17	28-2B
		Macro 10	44-47	17-18	2C-2F
		Macro 11	48-51	19-20	30-33
		Macro 12	52-55	20-22	34-37
		Macro 13	56-59	22-23	38-3B
		Macro 14	60-63	24-25	3C-3F
		Macro 15	64-67	25-26	40-43

Table A-3. Studio Color® 250 Construct Parameters

Channel	Construct	Description	Value (dec.)	Value (%)	Value (hex)
14 (cont.)	Macro/LAD (cont.)	Macro 16	68-71	27-28	44-47
		Macro 17	72-75	28-29	48-4B
		Macro 18	76-79	30-31	4C-4F
		Macro 19	80-83	31-33	50-53
		Macro 20	84-87	33-34	54-57
		Macro 21	88-91	35-36	58-5B
		Macro 22	92-95	36-37	5C-5F
		Macro 23	96-99	38-39	60-63
		Macro 24	100-103	39-40	64-67
		Macro 25	104-107	41-42	68-6B
		Macro 26	108-111	42-44	6C-6F
		Macro 27	112-115	44-45	70-73
		Macro 28	116-119	46-47	74-77
		Macro 29	120-123	47-48	78-7B
		Macro 30	124-127	49-50	7C-7F
		Macro 31	128-131	50-51	80-83
		Macro 32	132-135	52-53	84-87
		Random Macros (Variable)	136-167	53-66	88-A7
		LAD Off / No Macros	168-199	66-78	A8-C7
		LAD Modulate (Variable)	200-231	78-91	C8-E7
		LAD On	232-255	91-100	E8-FF
15	Control *(After choosing a control channel value, set the Shutter channel to "O" to access the Control channel settings)*	Safe (normal operation)	0-9	0-4	0-9
		Pan & Tilt MSpeed Off	10-19	4-8	0A-13
		Display Off	20-28	8-11	14-1C
		Display Dim	30-38	12-15	1E-26
		Display Bright	40-48	16-19	28-30
		Home	60-68	24-27	3C-44
		Lamp On	80-88	31-35	50-58
		Lamp Off	90-98	35-38	5A-62
		Shutdown *(send this value for approximately two seconds)*	120-130	47-51	78-82

MSpeed Times

Table A-4 lists the MSpeed (motor) movement times and their corresponding DMX controller values. If you have a numeric-type controller, use the Value Decimal (dec.)

column. If you have a fader-type controller, use the Value Percentage (%) column. If your controller allows you to program hex values, use the Value (hex) column.

The values in Table A-4 may vary slightly depending on your controller's rounding convention.

Table A-4. MSpeed Times

Time (sec.)	Value (dec.)	Value (%)	Value (hex)	Time (sec.)	Value (dec.)	Value (%)	Value (hex)	Time (sec.)	Value (dec.)	Value (%)	Value (hex)
0.15	255	100	FFh	4.00	224	88	E0h	15.56	193	76	C1h
0.15	254	100	FEh	4.25	223	87	DFh	16.06	192	75	C0h
0.17	253	99	FDh	4.52	222	87	DEh	16.57	191	75	BFh
0.19	252	99	FCh	4.78	221	87	DDh	17.09	190	75	BEh
0.21	251	98	FBh	5.06	220	86	DCh	17.61	189	74	BDh
0.25	250	98	FAh	5.34	219	86	DBh	18.14	188	74	BCh
0.29	249	98	F9h	5.64	218	85	DAh	18.68	187	73	BBh
0.35	248	97	F8h	5.94	217	85	D9h	19.23	186	73	BAh
0.41	247	97	F7h	6.25	216	85	D8h	19.79	185	73	B9h
0.47	246	96	F6h	6.56	215	84	D7h	20.36	184	72	B8h
0.55	245	96	F5h	6.89	214	84	D6h	20.93	183	72	B7h
0.63	244	96	F4h	7.22	213	84	D5h	21.51	182	71	B6h
0.73	243	95	F3h	7.56	212	83	D4h	22.10	181	71	B5h
0.83	242	95	F2h	7.91	211	83	D3h	22.70	180	71	B4h
0.94	241	95	F1h	8.27	210	82	D2h	23.30	179	70	B3h
1.05	240	94	F0h	8.63	209	82	D1h	23.92	178	70	B2h
1.18	239	94	EFh	9.00	208	82	D0h	24.54	177	69	B1h
1.31	238	93	EEh	9.39	207	81	CFh	25.17	176	69	B0h
1.45	237	93	EDh	9.77	206	81	CEh	25.80	175	69	AFh
1.60	236	93	ECh	10.17	205	80	CDh	26.45	174	68	AEh
1.75	235	92	EBh	10.58	204	80	CCh	27.10	173	68	ADh
1.92	234	92	EAh	10.99	203	80	CBh	27.76	172	67	ACh
2.09	233	91	E9h	11.41	202	79	CAh	28.43	171	67	ABh
2.27	232	91	E8h	11.84	201	79	C9h	29.11	170	67	AAh
2.46	231	91	E7h	12.28	200	78	C8h	29.80	169	66	A9h
2.66	230	90	E6h	12.72	199	78	C7h	30.49	168	66	A8h
2.86	229	90	E5h	13.17	198	78	C6h	31.19	167	65	A7h
3.07	228	89	E4h	13.63	197	77	C5h	31.90	166	65	A6h
3.29	227	89	E3h	14.10	196	77	C4h	32.62	165	65	A5h
3.52	226	89	E2h	14.58	195	76	C3h	33.34	164	64	A4h
3.76	225	88	E1h	15.07	194	76	C2h	34.08	163	64	A3h

Table A-4. MSpeed Times

Time (sec.)	Value (dec.)	Value (%)	Value (hex)	Time (sec.)	Value (dec.)	Value (%)	Value (hex)	Time (sec.)	Value (dec.)	Value (%)	Value (hex)
34.82	162	64	A2h	66.85	126	49	7Eh	109.28	90	35	5Ah
35.57	161	63	A1h	67.89	125	49	7Dh	110.61	89	35	59h
36.33	160	63	A0h	68.94	124	49	7Ch	111.94	88	35	58h
37.09	159	62	9Fh	69.99	123	48	7Bh	113.28	87	34	57h
37.87	158	62	9Eh	71.05	122	48	7Ah	114.63	86	34	56h
38.65	157	62	9Dh	72.13	121	47	79h	115.99	85	33	55h
39.44	156	61	9Ch	73.20	120	47	78h	117.36	84	33	54h
40.23	155	61	9Bh	74.29	119	47	77h	118.73	83	33	53h
41.04	154	60	9Ah	75.38	118	46	76h	120.12	82	32	52h
41.85	153	60	99h	76.49	117	46	75h	121.51	81	32	51h
42.68	152	60	98h	77.60	116	45	74h	122.91	80	31	50h
43.50	151	59	97h	78.71	115	45	73h	124.31	79	31	4Fh
44.34	150	59	96h	79.84	114	45	72h	125.73	78	31	4Eh
45.19	149	58	95h	80.98	113	44	71h	127.15	77	30	4Dh
46.04	148	58	94h	82.12	112	44	70h	128.58	76	30	4Ch
46.90	147	58	93h	83.27	111	44	6Fh	130.02	75	29	4Bh
47.77	146	57	92h	84.43	110	43	6Eh	131.47	74	29	4Ah
48.65	145	57	91h	85.59	109	43	6Dh	132.92	73	29	49h
49.54	144	56	90h	86.77	108	42	6Ch	134.39	72	28	48h
50.43	143	56	8Fh	87.95	107	42	6Bh	135.86	71	28	47h
51.33	142	56	8Eh	89.14	106	42	6Ah	137.34	70	27	46h
52.24	141	55	8Dh	90.34	105	41	69h	138.82	69	27	45h
53.16	140	55	8Ch	91.55	104	41	68h	140.32	68	27	44h
54.09	139	55	8Bh	92.76	103	40	67h	141.82	67	26	43h
55.02	138	54	8Ah	93.98	102	40	66h	143.33	66	26	42h
55.96	137	54	89h	95.21	101	40	65h	144.85	65	25	41h
56.91	136	53	88h	96.45	100	39	64h	146.38	64	25	40h
57.87	135	53	87h	97.70	99	39	63h	147.92	63	25	3Fh
58.84	134	53	86h	98.95	98	38	62h	149.46	62	24	3Eh
59.81	133	52	85h	100.22	97	38	61h	151.01	61	24	3Dh
60.79	132	52	84h	101.49	96	38	60h	152.57	60	24	3Ch
61.78	131	51	83h	102.77	95	37	5Fh	154.14	59	23	3Bh
62.78	130	51	82h	104.05	94	37	5Eh	155.71	58	23	3Ah
63.79	129	51	81h	105.35	93	36	5Dh	157.30	57	22	39h
64.80	128	50	80h	106.65	92	36	5Ch	158.89	56	22	38h
65.82	127	50	7Fh	107.96	91	36	5Bh	160.49	55	22	37h

Table A-4. MSpeed Times

Time (sec.)	Value (dec.)	Value (%)	Value (hex)	Time (sec.)	Value (dec.)	Value (%)	Value (hex)	Time (sec.)	Value (dec.)	Value (%)	Value (hex)
162.09	54	21	36h	225.30	18	7	12h				
163.71	53	21	35h	227.20	17	7	11h				
165.33	52	20	34h	229.11	16	6	10h				
166.96	51	20	33h	231.03	15	6	0Fh				
168.60	50	20	32h	232.96	14	5	0Eh				
170.25	49	19	31h	234.90	13	5	0Dh				
171.91	48	19	30h	236.84	12	5	0Ch				
173.57	47	18	2Fh	238.79	11	4	0Bh				
175.24	46	18	2Eh	240.75	10	4	0Ah				
176.92	45	18	2Dh	242.72	9	4	09h				
178.61	44	17	2Ch	244.70	8	3	08h				
180.30	43	17	2Bh	246.68	7	3	07h				
182.01	42	16	2Ah	248.68	6	2	06h				
183.72	41	16	29h	250.68	5	2	05h				
185.44	40	16	28h	252.68	4	2	04h				
187.17	39	15	27h								
188.90	38	15	26h								
190.65	37	15	25h								
192.40	36	14	24h								
194.16	35	14	23h								
195.92	34	13	22h								
197.70	33	13	21h								
199.48	32	13	20h								
201.28	31	12	1Fh								
203.08	30	12	1Eh								
204.88	29	11	1Dh								
206.70	28	11	1Ch								
208.52	27	11	1Bh								
210.36	26	10	1Ah								
212.19	25	10	19h								
214.04	24	9	18h								
215.90	23	9	17h								
217.76	22	9	16h								
219.63	21	8	15h								
221.51	20	8	14h								
223.40	19	7	13h								

Appendix B
Macros

Macro Descriptions

This appendix includes information about the specific constructs used for each factory-programmed macro in Studio Spot 250 and Studio Color 250 fixtures. Table B-1 lists a description for each macro and shows which constructs are used or affected by each macro.

Table B-1. Macro Descriptions

Macro	Description	Constructs Used	Macro affected by construct value change
1	Odd-numbered fixtures on the link perform a "lazy eight" movement, followed by even-numbered fixtures.	• pan • tilt • MSpeed	The pan and tilt construct values scale the "lazy eight" movement range.
2	Sequentially-numbered fixtures (in groups of two) perform a "ballyhoo" movement.	• pan • tilt • MSpeed	The pan and tilt construct values scale the "ballyhoo" movement range.
3	Sequentially-numbered fixtures (in groups of four) perform a tilt "wave" movement.	• tilt • shutter • MSpeed	
4	Odd-numbered fixtures on the link perform a pan "lighthouse" movement, followed by even-numbered fixtures.	• pan • shutter • MSpeed	
5	Odd-numbered fixtures perform a "swoop" movement, followed by even-numbered fixtures.	• pan • tilt • dim	
6	Sequentially-numbered fixtures (in groups of four) perform a "swoop" movement.	• pan • tilt • dim	
7	Odd-numbered fixtures perform a slow ramp open and ramp shut dim movement, followed by even-numbered fixtures.	dim	
8	Sequentially-numbered fixtures (in groups of four) perform a slow ramp open and ramp shut dim movement.	dim	

Table B-1. Macro Descriptions

Macro	Description	Constructs Used	Macro affected by construct value change
9-32	*Reserved for future use.*		

Note: Information on new macros will be posted on the High End Systems web site and included with new software releases. The High End Systems web site address is listed in "Contacting High End Systems" on page ii.

Appendix C
Important Safety Information

Warning: For Continued Protection Against Fire
1. This equipment is designed for use with a Philips 250 Watt, GY 9.5 base, M Series, metal halide lamp only. Use of any other type lamp may be hazardous and may void the warranty.
2. Do not mount on a flammable surface.
3. Maintain minimum distance of 1.0 meter (3.28 feet) from combustible materials.
4. Replace fuses only with the specified type and rating.
5. Observe minimum distance to lighted objects of 1.0 meter (3.28 feet).
6. This equipment for connection to branch circuit having a maximum overload protection of 20 A.

Warning: For Continued Protection Against Electric Shock
1. If this equipment was received without a line cord plug, attach the appropriate line cord plug according to the following code:
   - brown–live
   - blue–neutral
   - green/yellow–earth
2. As the colours of the cores in the mains lead of this equipment may not correspond with the coloured markings identifying the terminals in your plug, proceed as follows:
   - the core which is coloured green and yellow must be connected to the terminal in the plug which is marked with the letter E or by the earth symbol ⏚, or coloured green or green and yellow.
   - the core which is coloured blue must be connected to the terminal which is marked with the letter N or coloured black.
   - the core which is coloured brown must be connected to the terminal which is marked with the letter L or coloured red.
3. Class I equipment. This equipment must be earthed.
4. Equipment suitable for dry locations only. Do not expose this equipment to rain or moisture.
5. Disconnect power before re-lamping or servicing.
6. Refer servicing to qualified personnel; no user serviceable parts inside.

Warning: For Continued Protection Against Exposure To Excessive Ultraviolet (UV) Radiation
1. Do not operate this equipment without complete lamp enclosure in place or if shields, lenses, or ultraviolet screens are damaged.

2. Change shields, lenses, or ultraviolet screens if they have become visibly damaged to such an extent that their effectiveness is impaired, for example by cracks or deep scratches.
3. Never look directly at the lamp while lamp is on.

Warning: For Continued Protection Against Injury To Persons
1. Use secondary safety cable when mounting this fixture.
2. Caution: hot lamp may be an explosion hazard. Do not open for 5 minutes after switching off. Wear eye and hand protection when re-lamping.
3. Equipment surfaces may reach temperatures up to 100° C (212° F). Allow 5 minutes for cooling before handling.
4. Change the lamp if it becomes damaged or thermally deformed.

Appendice C
Importantes Informations Sur La Sécurité

Mise En Garde: Pour Une Protection Permanente Contre Les Incendies
1. Cet appareil est conçu uniquement pour une lampe métallique à halogène Philips série M, de 250 watts, à base GY 9.5. Son utilisation avec tout autre type de lampe peut être dangereuse et annuler la garantie.
2. Ne pas monter les lampes sur une surface inflammable.
3. Maintenir à une distance minimum de 1.0 mètre de matières inflammables.
4. Ne remplacer les fusibles qu'avec des modèles et valeurs assignées recommandés.
5. Respecter une distance minimum de 1.0 mètre par rapport aux objets éclairés.
6. Cet appareil de connection au circuit comporte une protection contre les surcharges de 20 A.

Mise En Garde: Pour Une Protection Permanente Contre Les Chocs Électriques
1. Si cet équipement est livré sans prise de cable, veuillez connecter la prise de cable correcte selon le code suivant:
   • marron - phase
   • bleu - neutre
   • vert/jaune - terre
2. Débrancher le courant avant de changer les lampes ou d'effectuer des réparations.
3. Cet équipement doit être uniquement utilisé dans des endroits secs. Ne pas l'exposer à la pluie ou l'humidité.
4. À l'intérieur de l'équipement il n'y a pas de pièces remplaçables par l' utilisateur. Confiez l'entretien à un personnel qualifié.
5. Equipement de Classe I. Cet équipement doit être mis à la terre.

Mise En Garde: Pour Une Protection Permanente Contre Des Expositions Excessives Aux Rayons Ultra Violets (UV)

1. Ne pas utiliser cet appareil si le boîtier de la lampe n'est pas complètement fixé ou si les blindages, lentilles, ou écrans ultraviolets sont endommagés.
2. Changer les blindages ou les écrans ultraviolets s'ils sont visiblement endommagés au point que leur efficacité aient été altérée, par exemple par des fissures ou de profondes égratignures.
3. Ne jamais regarder directement la lampe quand celle ci est allumée.

Mise En Garde: Pour Une Protection Permanente Contre Les Blessures Corporelles

1. Lors de l'assemblage, utiliser un câble de sécurité secondaire.
2. AVERTISSEMENT: les lampes chaudes comportent un risque d'explosion. Après l'avoir éteinte, attendre 5 minutes avant de la dégager. Lors du remplacement de la lampe, une protection des yeux et des mains est requise.
3. Les surfaces de l'appareil peuvent atteindre des températures de 100 C. Laisser refroidir pendant 5 minutes avant la manipulation.
4. Changer la lampe si elle est endommagée ou thermiquement déformée.

Anhang C
Wichtige Hinweise Für Ihre Sicherheit

Warnung: Zum Schutz Vor Brandgefahr

1. Dieses Gerät ist nur für den Gebrauch mit einer 250-Watt, Philips Serie M, Metall-Halogen-Lampe mit GY 9.5-Sockel konzipiert. Der Gebrauch irgend eines anderen Lampentyps könnte Sie gefährden und Ihre Garantie außer Kraft setzen.
2. Das Gerät nie auf einer feuergefährlichen Fläche montieren.
3. Stets einen Mindestabstand von 1 Meter zu brennbaren Materialien einhalten.
4. Zum Ersatz nur Sicherungen verwenden, die dem vorgeschriebenen Typ und Nennwert entsprechen.
5. Einen Mindestabstand von 1 Meter zu den angestrahlten Objekten einhalten.
6. Dieses Gerät darf nur an eine Zweigleitung mit einem Überlastungsschutz von höchstens 20 A angeschlossen werden.

Warnung: Zum Schutz Gegen Gefährliche Körperströme

1. Wenn dieses Gerät ohne einen Netzkabelstecker erhalten wurde, ist der entsprechende Netzkabelstecker entsprechend dem folgenden Code anzubringen:
   • Braun - Unter Spannung stehend
   • Blau - Neutral
   • Grün/Gelb - Erde
2. Vor dem Austauschen von Lampen oder vor Wartungsarbeiten stets den Netzstecker ziehen.

3. Diese Geräte sind nur zum Einbau in trockenen Lagen bestimmt und müssen vor Regen und Feuchtigkeit geschützt werden.
4. Servicearbeiten sollten nur von Fachpersonal ausgeführt werden. Das Gerät enthält keine wartungsbedürftigen Teile.
5. Dieses Gerät gehört zur Klasse I. Dieses Gerät muß geerdet werden.

Warnung: Zum Schutz Gegen Übermässige Ultraviolett (UV)-Bestrahlung
1. Benutzen Sie dieses Gerät nur, wenn das komplette Lampengehäuse fest eingebaut ist; ebenfalls dürfen keine der Schutzabdeckungen, Linsen oder der UV-Schutz Beschädigungen aufweisen.
2. Die Schutzabdeckungen, Linsen und der UV-Schutz müssen ausgewechselt werden, wenn sie sichtlich dermaßen beschädigt sind, daß sie ihre Wirksamkeit einbüßen, z.B. infolge von Rissen oder tiefen Kratzern.
3. Nie direkt in die eingeschaltete Lampe schauen.

Warnung: Zum Schutz Vor Verletzungen
1. Verwenden Sie bei der Installation des Beleuchtungskörpers ein zusätzliches Sicherheitskabel.
2. VORSICHT: Bei einer heiße Lampe besteht Explosionsgefahr. Nach dem Abschalten der Netzspannung sollten Sie etwa 5 Minuten warten, bevor Sie das Lampengehäuse öffnen. Schützen Sie beim Auswechseln der Lampen Ihre Hände und tragen Sie eine Schutzbrille.
3. Die Oberflächen des Gerätes können Temperaturen bis zu 100 C erreichen. Vor dem Anfassen stets 5 Minuten lang abkühlen lassen.
4. Falls die Lampe beschädigt oder durch Wärmeeinwirkung verformt ist, muß sie ausgewechselt werden.

Apéndice C
Información Importante De Seguridad

Advertencia: Para Protección Continua Contra Incendios
1. Este equipo está diseñado para utilizarse únicamente con la lámpara de haluro metálico Philips serie M, de 250 vatios y base GY 9.5. El uso de cualquier otro tipo de lámpara puedá resultar peligroso, y puedá anular la garantía.
2. No monte el equipo sobre una superficie inflamable.
3. Mantenga una distancia mínima de materiales combustibles de 1,0 metro.
4. Cambie los fusibles únicamente por otros que sean del tipo y la clasificación especificadas.
5. Guarda una distancia mínima a objetos iluminados de 1,0 metro.
6. Este equipo debe conectarse a un circuito que tenga una protección máxima contra las sobrecargas de 20 A.

Advertencia: Para La Protección Continua Contra Electrocuciones

1. Si se recibió este equipo sin el enchufe de alimentacion, monte usted el enchufe correcto según el clave siguente:
   - moreno - vivo
   - azul - neutral
   - verde/amarillo - tierra
2. Desconecte el suministro de energía antes de recambiar lámparas o prestar servicio de reparación.
3. Questa apparecchiatura e' da usarsi in ambienti secchi. Non e' da essere esposta ne alla pioggia ne all' umidita'.
4. Derive el servicio de reparación de este equipo al personal calificado. El interior no contiene repuestos que puedan ser reparados por el usuario.
5. Equipo de Clase I. Este equipo debe conectarse a la tierra.

C

Advertencia: Para Protección Continua Contra La Exposición A Radiación Ultravioleta (UV) Excesiva

1. No opere este equipo sin tener colocada en su lugar la caja protectora completa de la lámpara o bien, si el blindaje, los lentes o las pantallas ultravioletas están dañadas.
2. Cambie el blindaje, los lentes o las pantallas ultravioleta si nota una avería visible, a tal grado que su eficacia se vea comprometida. Por ejemplo, en el caso de grietas o rayaduras profundas.
3. Jamás mire directamente a la lámpara en tanto ésta esté encendida.

Advertencia: Para Protección Continua Contra Lesiones Corporales

1. Al montare questa apparechiatura, usare un secondo cavo di sicurezza.
2. Precaución: una lámpara caliente puede constituir un peligro de explosión. No la abra por 5 minutos luego de haberla apagado. Lleve puestos, un protector ocular, y guantes al recambiar lámparas.
3. Las superficies del equipo pueden alcanzar temperaturas máximas de 100 grados centígrados. Deje que se enfríen por 5 minutos antes de tocarlas.
4. Cambie la lámpara si ésta se avería o deforma por acción térmica.

Appendice C
Importanti Informazioni Di Sicurezza

Avvertenza: Per Prevenire Incendi

1. Questa apparecchiatura è stata progettata per l'uso esclusivo con lampada a sali metallici Philips da 250 watt, base GY 9.5, serie M. L'uso di qualsiasi altro tipo di lampada può essere pericoloso e può annullare la garanzia.
2. Da non montare sopra una superficie infiammabile.
3. Mantenere l' apparecchio a un minimo di 1.0 metri (3.28 piedi) di distanza dai materiali combustibili.

4. Rimpiazare i fusibili usando soltanto quelli del tipo e della taratura adatta.
5. Mantenere una distanza minima di 1.0 metri (3.28 piedi) dagli oggetti accesi.
6. Questa apparecchiatura e' da collegarsi ad un circuito con una protezione da sovraccarico massima di 20 amperes.

Avvertenza: Per Prevenire Le Scosse Elettriche
1. Se questa apparecchiatura è stata consegnata senza una spina del cavo di alimentazione, collegare la spina appropriata del cavo di alimentazione in base ai seguenti codici:
   - marrone - sotto tensione
   - blu - neutro
   - verde/giallo - terra
2. Disinnestare la corrente prima di cambiare la lampadina o prima di eseguire qualsiasi riparazione.
3. Este equipo se adecua a lugares secos solamente. no lo exponga a la lluvia o humedad.
4. Per qualsiasi riparazione rivolgersi al personale specializzato. L' utente non deve riparare nessuna parte dentro l' unita'.
5. Aparecchio di Classe I. Questa apparecchiatura deve essere messa a terra.

Avvertenza: Per Proteggersi Contro Le Radiazioni Dei Raggi Ultravioletti

Non usare questa apparecchiatura se il sistema di chiusura della lampadina non e' completo o se gli scudetti, le lenti, o gli schermi ultravioletti si sono visibilmente danneggiati di maniera tale che la loro efficacia sia stata ridotta --- ad esempio, se vi sono visibili spaccature o graffi profondi. Mai guardare direttamente verso la lampadina quando sia accesa.

Avvertenza: Per Non Ferire Ad Altre Persone
1. Use cable secundario de seguridad al montar este aparato.
2. Avvertenza: la lampadina calda potrebbe esplodere. Spegnerla per 5 minuti prima di aprirla. Usare protezzioni per le mani e per gli occhi prima di cambiare la lampadina.
3. Le superfici della apparecchiatura possono arrivare a temperature di 100 gradi centrigradi (212 gradi f). Aspettare 5 minuti prima di maneggiare.
4. Cambiare la lampadina se si danneggia o se si e' deformata dovuto alle alte temperature.

Vigtig Sikkerhedsinformation

Advarsel: Beskyttelse mod elektrisk chock.

VIGTIGT! LEDEREN MED GUL/GROEN ISOLATION MAA KUN TILSLUTTES KLEMME MAERKET ⏚ ELLER ⏚.

Introduction

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